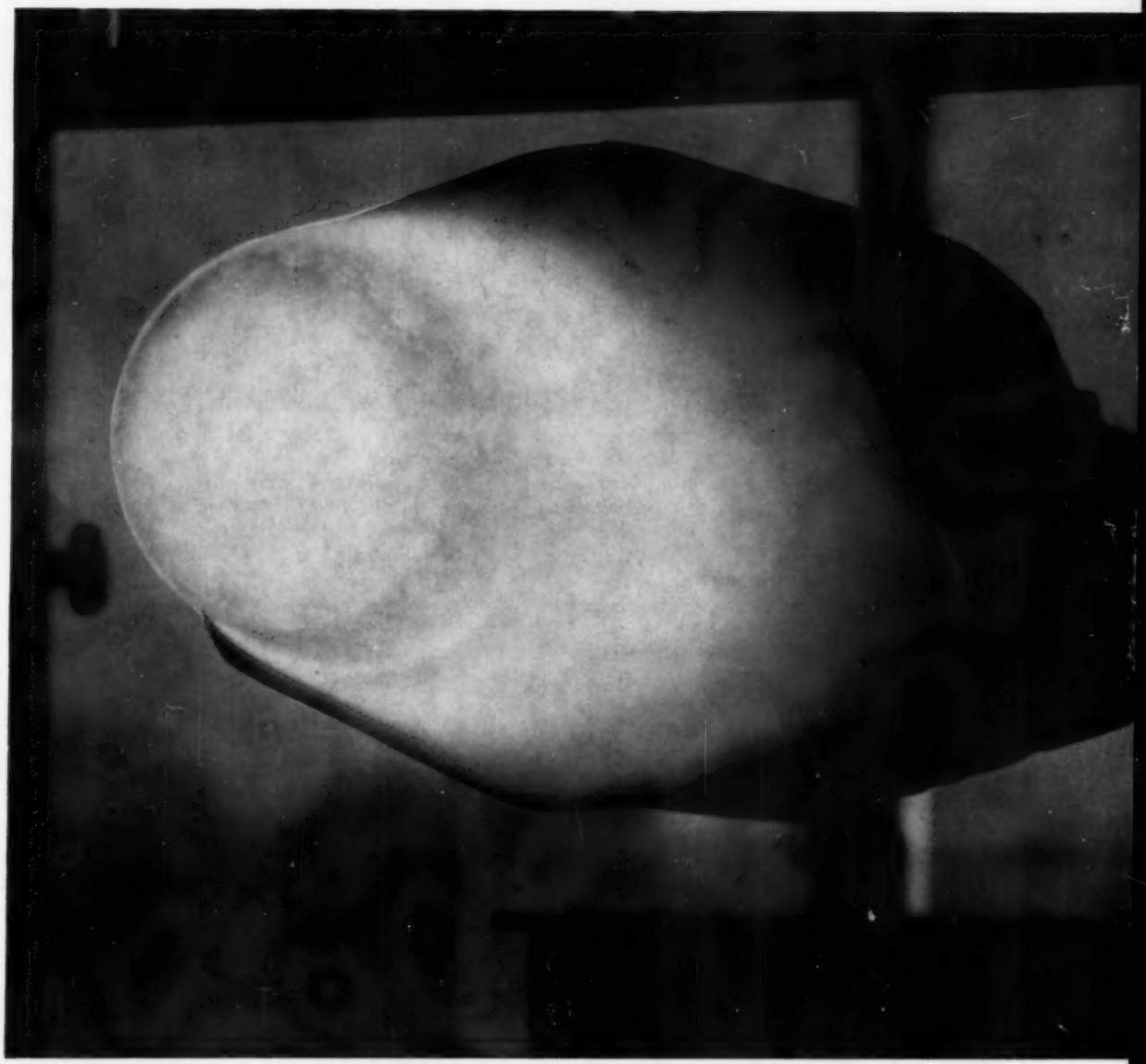
MAY 29, 1961

American Machinist / Metalworking Manufacturing

A McGRAW-HILL Publication • Seventy-Five Cents



4000 F blast tests ceramic nose cap for Dyna-Soar man-in-space project — see page 1

- **How Modern Is America's Metalworking Equipment?** page 55
- **When Magnesium and Mass Production Meet,** page 66

UNIVERSAL GRINDING

Reversing the Cost Trend

by Clifford G. Menard
Consulting Engineer
The Heald Machine Company

Just about everything costs *more* these days—*much* more than it did 10 or 15 years ago. And when we first decided to build a completely new Universal Internal Grinding Machine that would not only "hold the line", but actually *reverse* the upward cost trend, many an eyebrow was lifted in disbelief. Some said it couldn't be done. Others felt that major economies could be made only with a big sacrifice in performance.

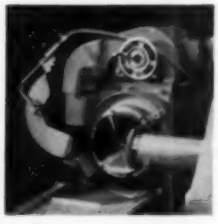
Admittedly, the task was not a simple one. In order to cut costs without cutting quality, we had to make a complete re-evaluation not only of the basic machine design, but of every step of our manufacturing operations as well. But we found that a large number of cost savings could be made, by utilizing the latest advances in machine design and streamlining production methods to eliminate as many manual operations as possible. Although most of the savings were relatively small individually, they added up to a major reduction in manufacturing cost.

This better, more versatile general purpose grinder costs about *half* as much as comparable machines today, and *less* than similar machines (with fewer features) cost in 1947!

Here's how some of the savings were made. The use of hydrostatic table ways eliminated an expensive booster arrangement in the hand table feed. An externally-mounted valve "package", on the front of the machine, simplified the hydraulic power arrangement and eliminated all but essential units in the hydraulic system. And with all hydraulics outside of the machine, the base is mechanically stronger and less expensive to produce because there are fewer holes and less surface area to finish. Furthermore, simplified basic engineering and construction make it possible to build this standard machine with standard arrangement on a STOCK basis resulting in shorter deliveries.

These and other refinements enabled us to make the 273A a truly universal machine with greater capacity, easier operation, and inherent precision that holds tolerances within .0001″ in normal production and .000050″ in special cases. Yet its 1947 price tag puts it within the economic reach of virtually every plant or machine shop, regardless of size.

Here's the new Model 273A Universal, on display at the 1960 Machine Tool Exposition. On a steel test piece, the O.D., a straight bore, a tapered bore and the face were ground to size within .0001″ at a single chucking.



Workhead swivel of 90°, several wheelhead positions, permit I.D., O.D. and rotary surface grinding of parts up to 12″ in diameter. Vari-speed workhead drive is infinitely adjustable from 75 to 450 rpm.

Ask your Heald Engineer for the complete UNIVERSAL story. Then compare its performance and cost with any other similar machine available today!

THE HEALD MACHINE COMPANY
Subsidiary of The Cincinnati Milling Machine Co.
Worcester 6, Massachusetts

CIRCLE 251 READER SERVICE CARD

COVER:
Dyna-Soar nose cap for man-in-space project is tested with 4000 F blast in Chance Vought's ramjet test facility.

American Machinist / *Metalworking Manufacturing*

contents for May 29, 1961

VOLUME 105, NO. 11

How modern is America's metalworking equipment? . . . At the midpoint between the 8th and 9th AM/MM Inventories, the editors make an estimate on the status now **55**

Grind away cutting costs . . . Sometimes grinding is the choice for reasons of economy instead of finish. *By Leo P Tarasov and Richard H Merritt, Norton Co* **58**

"Silex coffeemaker" de-gases steel . . . New Crucible Steel process takes 200 tons at once, costs 1¢ a pound **60**

Seven ratios reveal handling wastes **61**

Printed coils cut press time **62**

Spotwelding foil to heavy stock . . . Thin sheets joined to plate by right combination of pressure, current, and time. *By J R Fullerton, L E Leech, and D L Heyser, Ryan Aeronautical Co* **63**

Automatic line slashes nailmaking costs . . . Competition spurs development. Here's how improved methods are melting stiff price competition from abroad **64**

When magnesium and mass production meet . . . Volkswagen produces 4000 magnesium crankcases a day on automatic transfer lines. *By Anderson Ashburn* **66**

Sliding bolster cuts die change time . . . Downtime was cut in half on a 1250-ton press. *By N B Granberg, A O Smith Corp* **69**

Giant saw cuts giant scrap . . . Scrap breakup was put into the black in the process. *By Irving Epstein, Panama Machinery Co* **70**

How progressive can a die get? . . . Piercing, blanking, forming, and assembly are all combined in this progressive die. *By Pablo Dryere* **72**

Flexible "half mill" cuts setup, running times . . . Straddle milling with pneumatic fixtures handles 300 parts an hour **75**

Shop Shots . . . Bore honing at Barden, profile miller at Boeing, and automatic creep testing at Convair-San Diego **76**

REFERENCE BOOK SHEETS

Limits for plated threads, I, II . . . Tables on the actual limits of the thread at the pitch diameter both before and after plating. *By Robert D'Agostino, Loral Electronics Corp* **81**

TURN PAGE FOR METALWORKING REPORT ⟶

Trends . . .

Metalworking Report .. 2
Spot News .. 37
Washington .. 39
Detroit .. 41
Aircraft and Missiles .. 43
Machine Tools .. 45
Materials .. 47
What's Ahead .. 49

Departments . . .

Publisher's Letter .. 30
Letters .. 32
Calendar .. 35
Editorial .. 53
Talking Shop .. 85
Practical Ideas .. 86
Names .. 86
New Materials .. 91
New Equipment .. 93
Field Report .. 106

METALWORKING REPORT

. . . what's new and significant in manufacturing techniques and materials—

direct from our own staff and round-the-world news bureaus

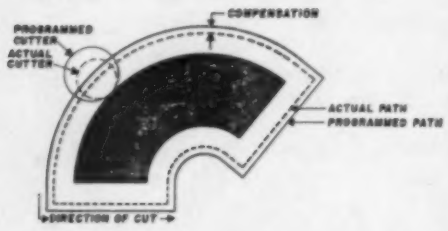
MATERIALS . . . New water-dispersible alumina powder, called Baymal by Du Pont its developer, **may become a ceramic-tool material.** The colloidal powder—said by company chemists to have more unique properties and uses than any Du Pont chemical in years—has been hot-pressed to form tools. **Tests show substantial grain growth, which impairs cutting, when the pure powder is heated** sufficiently to form corundum (alpha alumina). However, **scientists report promising experiments with grain-growth inhibitors.**

CUTTING . . . Abrasive machining—removing up to ¼ inch of metal with a grinder—can sometimes reduce setup times, sometimes cut machining times, reports the Norton Co, which also lists many other areas of potential savings (see p58). In one trial, abrasive machining was **2½ times faster than a vertical boring mill,** saved $1.39 per piece.

WELDING . . . Alternating current improves Mig welding for carbon steel and stainless, according to C R Sibley of Airco. His AWS paper stated that an **emissive coating on the electrode wire causes a stable ac Mig arc with major advantages over dc:** (1) no oxygen addition needed in shielding gas, (2) less expensive power supply, (3) arc blow reduced or eliminated, (4) all-position welding without changing power setting. Also, the process can even **weld dirty plate because ac gives a cleaning action.**

FINISHING . . . Rust preventive characteristics of red lead and other inhibitors **is equalled or exceeded by calcium and zinc molybdates** according to Battelle Memorial Institute. Molybdates are non-toxic and they are white, making them acceptable for food-processing machinery, food storage containers, water tanks, and water transmission lines.

MANUFACTURING CONTROL . . . Seven simple ratios can pinpoint weaknesses in materials-handling setups. The Yale & Towne ratios (see p 61) combined easy-to-get plant statistics to answer: Are workers moving materials unnecessarily? How effectively is space being used? Are production machines operating at their full capacity? With the ratios, **one electronics firm has reduced materials-handling expenses more than 50%.**

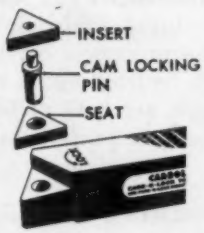


CUTTING . . . Automatic tool compensation up to 0.05 in. from programmed diameter is now optional on Bendix's DynaPath-20 series N/C contouring controls. As shown, actual centerline is displaced from programmed path by difference in radii between actual and programmed cutters. This lets operator **use reground tools or rough and finish with same tool and tape.**

ASSEMBLY . . . A hand-operated explosive tube expander is being used by Rohr Aircraft Co, Vista, Calif. When an operator slips two tubes into the device and **fires a 22-caliber blank cartridge,** the explosive force joins the tubes. Rohr plans to market the device.

COMPONENTS . . . Bearing separator cages can now be tailored for specific requirements by SKF engineers, because they have developed a new inspection system that pinpoints the forces transmitted to the cage by tractive action of rolling elements. This means more **positive safety margins for critical uses, and savings for industry** through improved design. After coating the cage with a layer of double-refracting plastic, they make high-speed color photos of polarized light bounced off the metal cage through the plastic. Resultant **edge-pattern photographs allow analyses said repeatable to within 10%.**

Cutting . . . Compact toolholder, which has only four parts including carbide insert, holds insert by cam action against the side of the hole. Developed by Metallurgical Products Dept, General Electric, the Carb-O-Lock holders—with shanks ½ to 2-in. sq for triangular and square inserts—will be **priced 30% lower than previous models.** Elimination of "club head" and clamp makes the holder as compact as a brazed tool. However, **application is limited to cutting cast iron and other materials that do not require a chipbreaker.**



MATERIALS . . . One-step enameling steel can cut enameling costs 15 to 50%, according to Bethlehem Steel. Bethnamel, which is produced by an "open-coil annealing process" in sheets and plates, **can be enameled in standard equipment.** Containing only 0.003% carbon, the steel is relatively easy to work and weld and has excellent sag resistance. Company reports **much better deep-drawing characteristics than conventional enameling iron.**

FINISHING . . . Vapor plating by chemically separating elements of a compound in plasma, rather than by simple vaporization, is being studied at Solar Aircraft Corp, San Diego. **Unwanted elements are flushed away as a gas or vapor** as the desired material coats the work. For example, molybdenum pentachloride breaks down into molybdenum and chlorine; the chlorine is swept away to leave a molybdenum coating. Although the technique is more expensive than commercially available methods, Solar claims **smoother coating, better adhesion, better control, and wider variety of coating materials.**

MATERIALS HANDLING . . . Need to count as many as 450,000 small parts an hour? That's what a new automatic parts counter can do. The electronic unit built by Atronic Products of Gala-Cynwyd, Pa, **is expected to speed up packaging operations tremendously.** After receiving incoming items that weigh between 0.01 and 2.5 oz, it weighs them electronically and then **puts the batch in an output chute or sends them back to the hopper.**

TREATING . . . Promising new technique, that might work for hydraulic cylinders, "sets" gun barrels so the ID won't increase with each round fired. Watervliet Arsenal is now developing a **swaging technique that forces a tapered, solid-carbide mandrel through copper-plated bore with 5000 psi.** Maximum diameter of mandrel (about 4 in.) is 0.120 in. greater than ID of tube; finish ID of tube is 0.080 in. greater than original.

Continued on next page

Coming in AM/MM

- *New data on machining malleable iron*
- *Rapid boring of deep holes*

INSPECTION . . . Electromagnetic "mouse" checks straightness of gun tubes at Watervliet Arsenal. It's a sensing device with a dial gage that shows amount of air gap between sensing head and the nearest magnetic material. The operator **suspends the mouse inside a gun tube** and, at a series of checking stations, he rotates the tube and determines maximum and minimum air gaps and their locations. A plot of these readings **tells where to push the tube with a hydraulic press to straighten it.**

FINISHING . . . Nitriding, successfully used to age harden beryllium copper at Leeds & Northrup, Philadelphia, **eliminates pickling and cleaning after conventional heat treating.** The process is carried out in a retort filled with closely packed parts surrounded with 5% hydrogen-95% nitrogen gas. After a one-hour purge, and an hour to heat retort, the **parts are held at 600 F for 2½ hours and then cooled to 100 F for 2 hours.** After this, they are removed and allowed to cool at room temperature.

FORMING . . . Formability studies on high-strength, heat-resistant metals at Boeing's Development Center, Seattle are being **aided by a Pacific press brake fitted with electrically heated die holders.** Other features of the machine are designed to give precise control of pressure, forming speed, and time—as well as temperature.

MATERIALS HANDLING . . . The Avistrapper applies tough but light rayon strapping to packages—automatically. Two models—one for 6-to-20-in. boxes, the other for 15-to-36-in. boxes—handle incoming packages in any length, without machine adjustment. American Viscose Corp reports this is the **first completely automatic method to apply the light but tough rayon strap** which weighs only one-fifth as much as steel.

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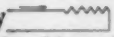
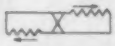
NEW POWERMATICS PRODUCE

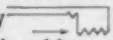
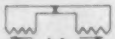
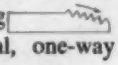
Maximum Cost Reduction for Intermediate Range Automatic Milling

The newest Cincinnati bed type . . . the POWERMATIC . . . fills the need for a fast, automatic medium-duty milling machine equipped to handle job shop quantities as well as high-volume work. They're built in two styles: Plain Automatic and Automatic Rise-and-Fall. These two styles give you a choice of automatic cycle compatible with modern tooling and methods. Here are the primary timesaving possibilities:

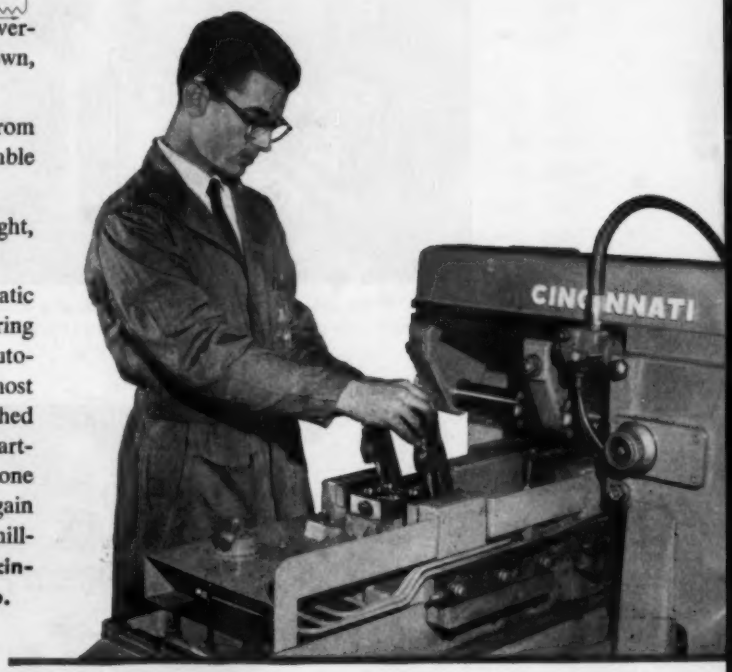
PLAIN AUTOMATIC

- One-way  and two-way  automatic table cycles.

AUTOMATIC RISE-AND-FALL

- One-way  and two-way  automatic table cycles, synchronized with vertical traverse of spindle carrier, feeding down, rapid up and down.
- Profile milling  within 30° rise from the horizontal, one-way and two-way table cycles.
- Box milling feeding left and right, and up and down.

It's easy to coordinate these and other Powermatic feature-advantages with advanced manufacturing engineering in the field of intermediate range automatic milling. And to help you devise the most efficient tooling, Cincinnati offers the unmatched experience of their Engineering Service Department. Now turn the page and you'll see how one Powermatic was tooled up by Cincinnati to gain maximum benefit from the automatic *profile* milling cycle. **Milling Machine Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.**



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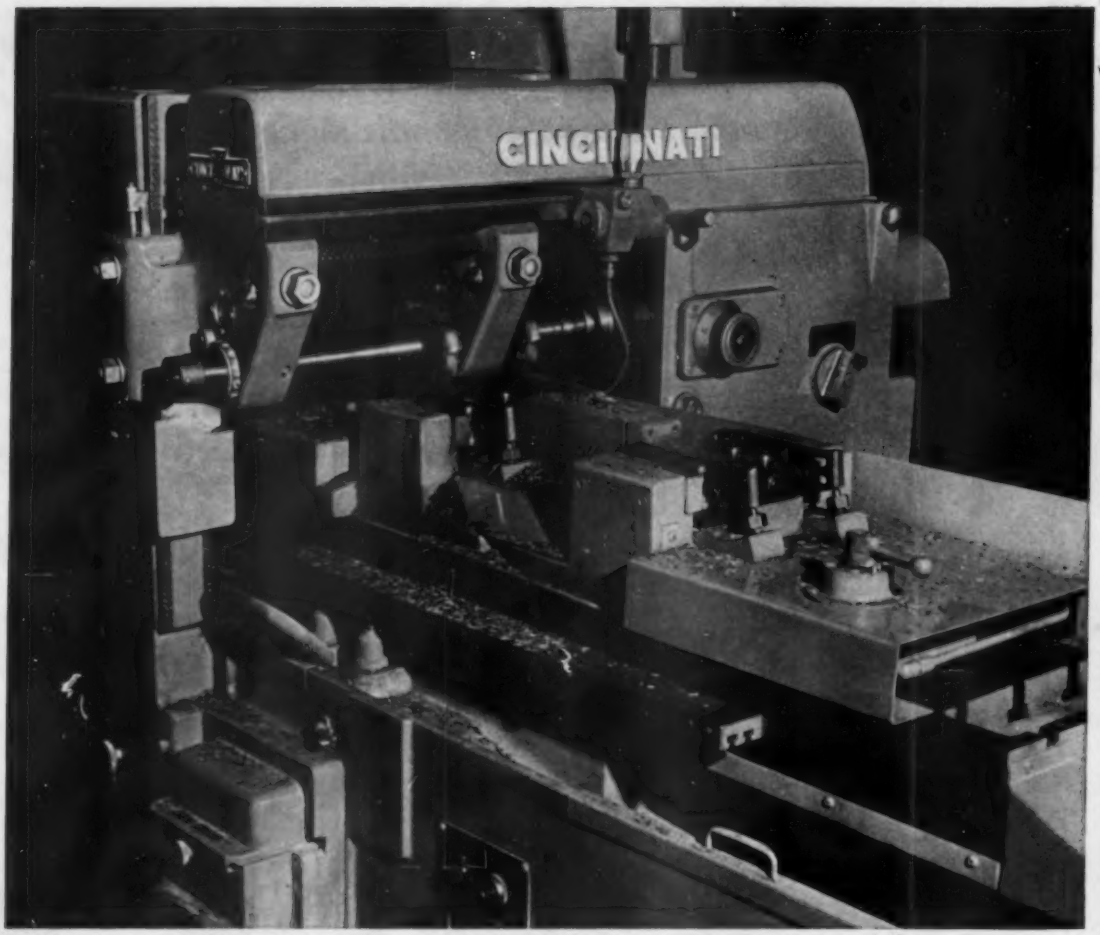
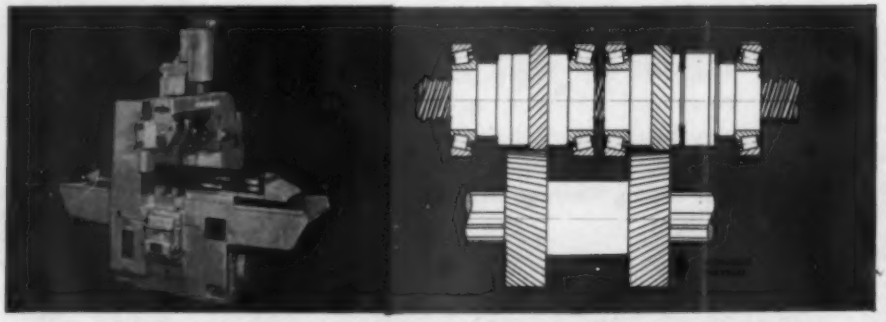


Shotgun frames are automatically profile milled, at a down-milling feed rate of 9-9/16 in./min., two abreast (four per cycle) on this new CINCINNATI Powermatic Rise-and-Fall Milling Machine.

CINCINNATI



CINCINNATI Powermatic Rise-and-Fall Milling Machine. 24" or 30" table travel; 7½ hp spindle drive. Catalog No. M-2167.

Automatic compensation for wear between table feed screw and nut; a prime feature-advantage for reciprocal setups and "down" milling.

KNEE TYPE AND BED TYPE MILLING MACHINES • DIE SINKING MACHINES • CUTTER AND TOOL GRINDERS •

THE CINCINNATI MILLING MACHINE CO., CINCINNATI 9, OHIO

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FOUR in ONE

TIMESAVING POWERMATIC CYCLE ...

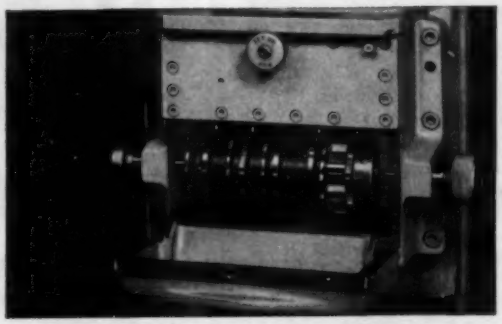
Four Parts Profile Milled Two Abreast

New CINCINNATI Powermatics give automatic cycle milling a new dimension in cost reduction. The example at the left shows one of the many unique possibilities. In a single timesaving cycle, bottom profiles are milled on four shotgun frames. They are mounted two abreast, in a Cincinnati designed, hydraulically operated fixture. Smooth down-milling, an advantage derived from Powermatic's automatic backlash eliminator, produces a superior finish and prevents springing of the work.

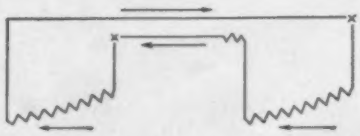
In addition to dozens of automatic cycles and the positive action automatic backlash eliminator, other Powermatic feature-advantages include:

- *Table feeds and spindle speeds easily changed* . . . simple pick-off gears; no wrenches required.
- *Single lever control* . . . starts the complete automatic cycle.
- *Effective chip and cutting fluid collecting system* . . . chip pans easily removed.
- *Dynapoise overarm* . . . damps chatter, allowing highest feed rates to be used.
- *One integral casting for the front base and column* . . . assures maximum rigidity for full hp cuts.

Many additional feature-advantages give new CINCINNATI Powermatics the highest cost-reducing potential for medium-duty work, in high-volume and medium-volume shops. Get more information by asking for a copy of Catalog M-2167.



Program director . . . a simple cycle selector controls sequence of events in automatic cycle. Can be interchanged in a minute or less.



A two-segment automatic cycle, one of dozens available on the new CINCINNATI *Powermatic Rise-and-Fall Milling Machine, is employed to profile mill four parts, two abreast.*

VERTICAL BROACHING MACHINES • ELECTRICAL MACHINING EQUIPMENT

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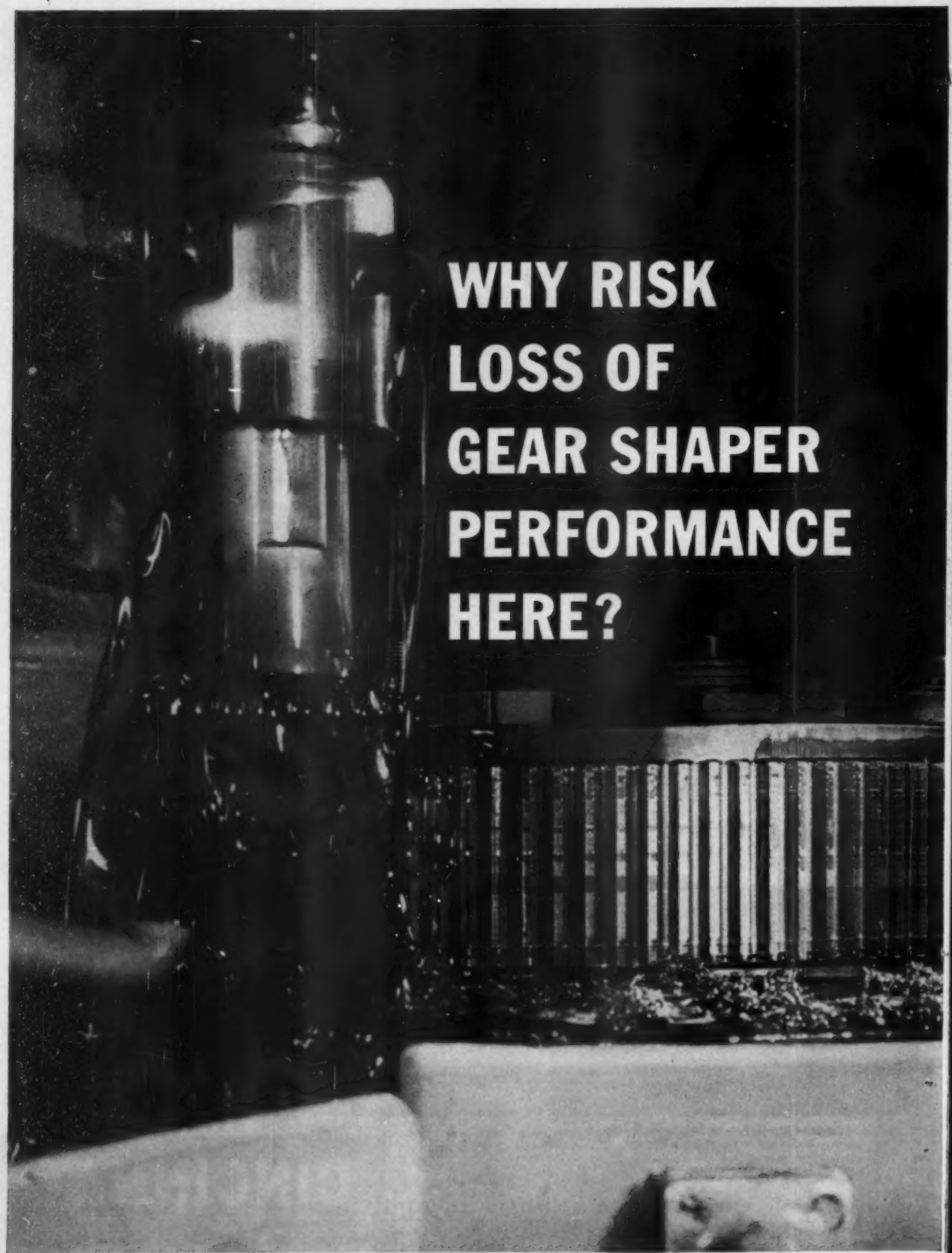
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Give your products all the high-production, high precision advantages of Fellows Gear Shaper performance by tooling up with Fellows cutters.

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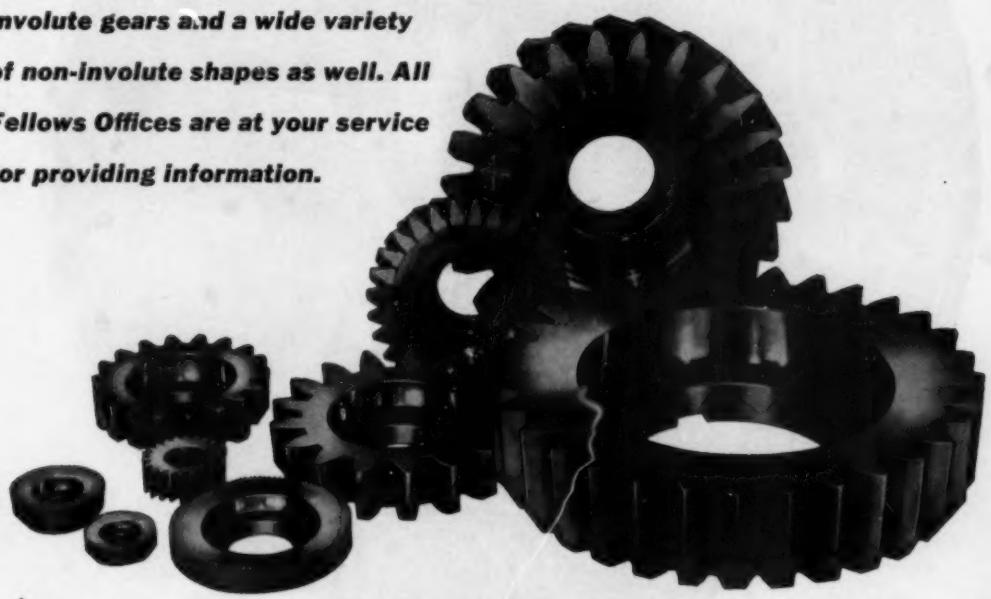
Fellows cutters on Fellows machines lower costs and speed production on external and internal, spur and helical involute gears and a wide variety of non-involute shapes as well. All Fellows Offices are at your service for providing information.



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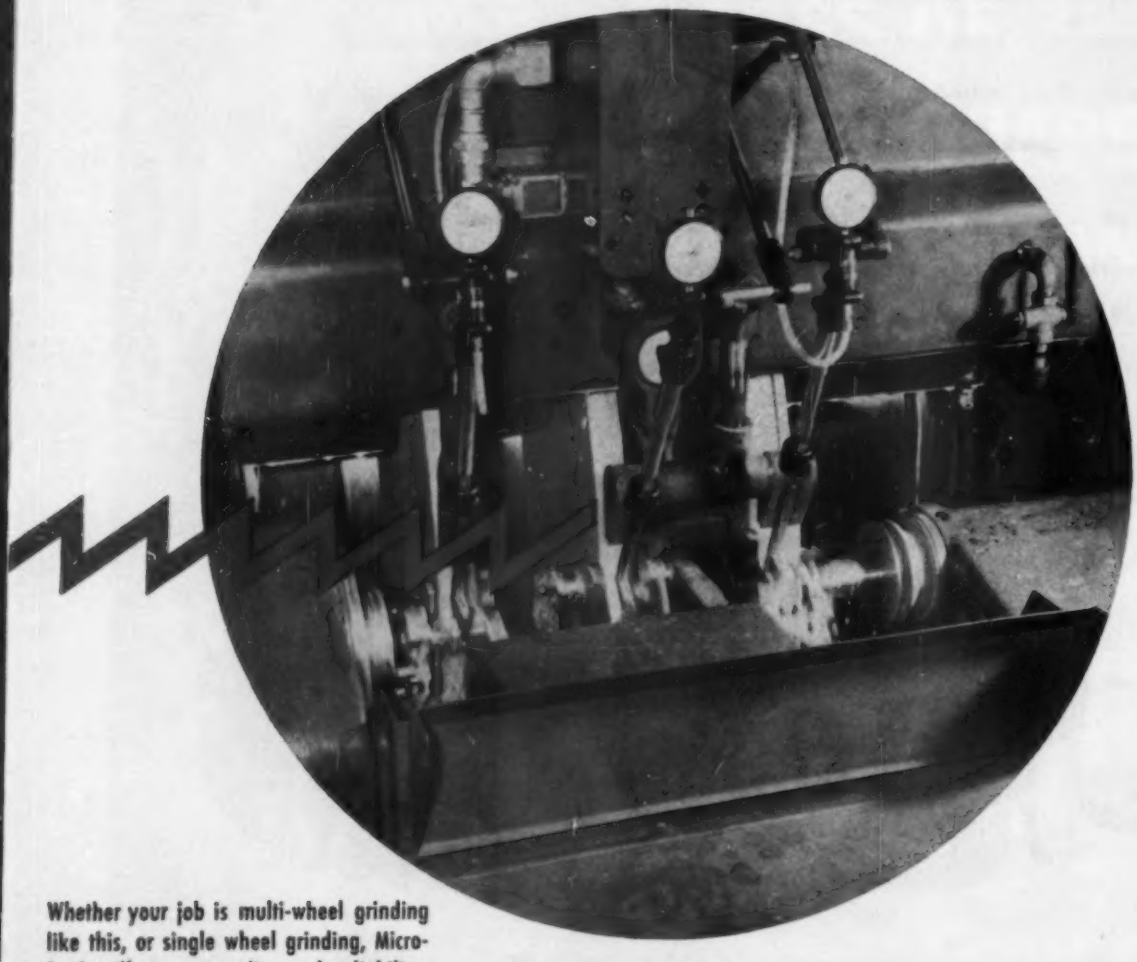
THE PRECISION LINE **Fellows** *Gear Production Equipment*

Automatic Race grinder | 10" R Plain grinder | 14" IWR Multiple Wheel grinder

Landis production grinders with Microfeed®



Whether your job is multi-wheel grinding like this, or single wheel grinding, Microfeed will assure quality and reliability.

typical Microfeed applications

tapered bearing race
specified size tolerance: .0002"

multiple diameter shaft
specified size tolerances: .0001"

Automatic Plunge grinder

Automatic Crankpin grinder

deliver closer tolerances consistently

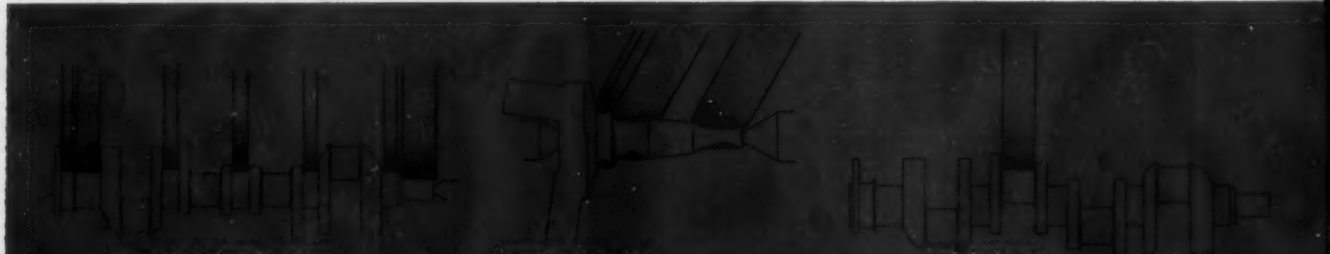
Microfeed

- a new Landis precision wheelfeed that is a major breakthru in size control
- specified on new Landis grinders, Microfeed assures cylindrical grinding precision to your specified tolerances on a production basis
- automatically cancels all variables affecting work size

LANDIS

world leader in precision grinders

LANDIS TOOL COMPANY, WAYNESBORO, PA.



crankshaft line bearings
specified size tolerances: .0005"

steering knuckle
specified size tolerance: .0006"

crankshaft pins
specified size tolerances: .0005"

Specify **HARDINGE** ELMIRA, N.Y.

Collets and Feed Fingers

and *Get the MOST from your Investment in Machine Tools*

A Machinist tells us,
"When you come right down to it,
it's common sense to specify
the best collets and feed fingers
after investing thousands of dollars
for a precision machine tool.
After all, it's the collet and feed finger
that passes the accuracy
of the machine on to the finished work."
HARDINGE Collets and Feed Fingers
are the best.
Be sure you specify HARDINGE for your
Automatic Screw Machines, Turret Lathes,
Chucking Machines, Tool Room Lathes,
Millers and Grinders.
HARDINGE

HARDINGE BROTHERS, INC., ELMIRA, N. Y.

"PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE"

Immediate stock delivery from Atlanta, Boston, Chicago, Dayton, Detroit, Elmira, Hartford, Los Angeles, New York, Philadelphia, Seattle, Portland, Minneapolis, Oakland, St. Louis, Springfield, N. J., and Toronto.

Eight of twelve Landis Abrasive No. 1½ surface grinders at Glennie Industries, Inc., a precision tool and die manufacturer in Romulus, Michigan.

GLENNIE INDUSTRIES REPORTS:

"Faster than any other hand operated grinder" for grinding punches and dies

Grinding the nose contour of an interchangeable ball type punch to tolerances of ±.0001"

At Glennie Industries, where grinding is the largest operation, Landis Abrasive No. 1½ surface grinders maintain high standards of precision and production. For similar results in your shop, request a call by a Landis Abrasive surface grinder representative.

LANDIS

ABRASIVE

precision surface grinders

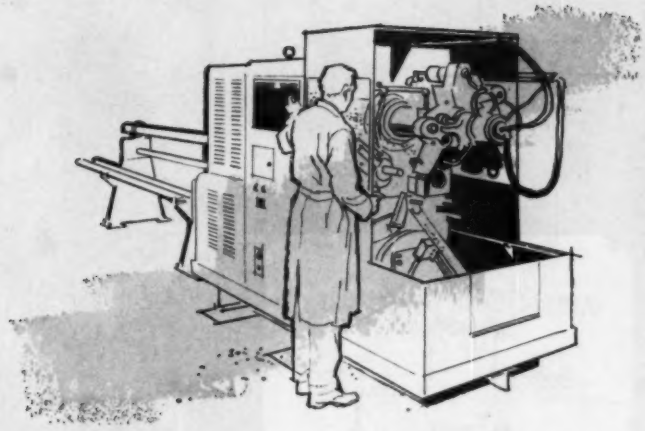
Landis Tool Company, Waynesboro, Penna.

For Deep Cuts With A Heavy Feed. The 2AB with its exclusive Single Cutter Turner is the only bar automatic that can hog metal like this. The part shown is machined from 2" C-1141 annealed bar stock. The 1¼" diameter is held to a .001" tolerance and 25 micro-inch finish in one cut!

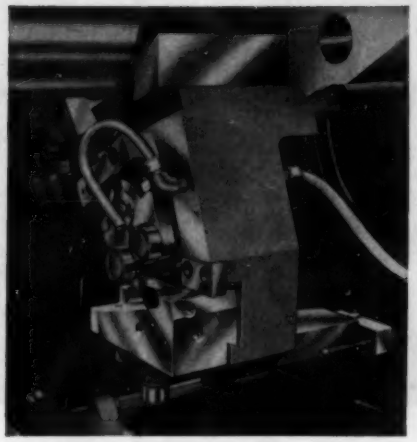
- Speed is 908 r.p.m. or 476 s.f.m.
- Feed is .024" per revolution
- Depth of cut, ⅜" • Length of cut, 4½"
- Power consumed, 30 H.P.

And this cut is accomplished in 13 seconds!

NEW IDEA IN BAR AUTOMATICS



Warner & Swasey's 3″ Single Spindle Bar Automatic features roller bar turners!



The cutter in the roller bar turner is automatically relieved at the end of the cut, eliminating cutter withdrawal marks and lengthening cutter life. The tool is automatically reset by a cam in an off-index position.

Deep cuts at heavy feeds plus burnished surfaces and better size control are the result of using turret lathe-type roller bar turners

The 2AB Bar Automatic utilizes the rugged overhead turret design made famous in hundreds of shops by the extensive line of Warner & Swasey "AC" chucking automatics. The overhead turret provides ample tool clearances for tool indexing and for advancing the heavy duty bar turner close-up to the collet. Thus, a major limitation of most large bar automatics is overcome, and the tested advantages of "roller turning" are now available to users of single spindle bar automatics.

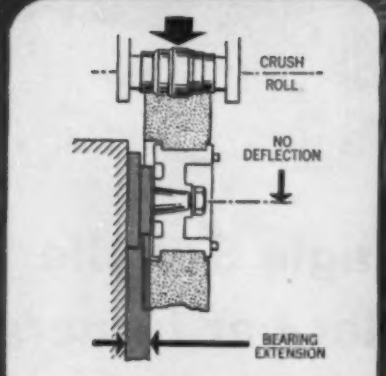
Ask a Warner & Swasey Field Engineer for details on how this productive automatic can handle your bar jobs. Warner & Swasey Company, Cleveland 3, Ohio.

YOU CAN TURN IT BETTER, FASTER, FOR LESS...WITH A WARNER & SWASEY

WARNER & SWASEY

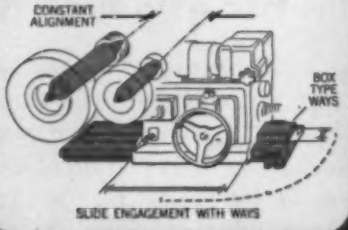
CIRCLE 264 READER SERVICE CARD

Van Norman's Industry-Integrated Design Has Industry Talking!



Rugged, heavy Grinding Wheel Spindle with its additional bearing extension withstands the terrific pressures of crush roll forming with NO DEFLECTION.

Maintained alignment of Grinding and Regulating Wheel Spindles is assured by the high engagement ratio of the Regulating Wheel Slide length to width.



HOW MICRO SWITCH FINISH GRINDS SMALL

Van Norman Centerless Grinders meet rigid design limits of famous precision

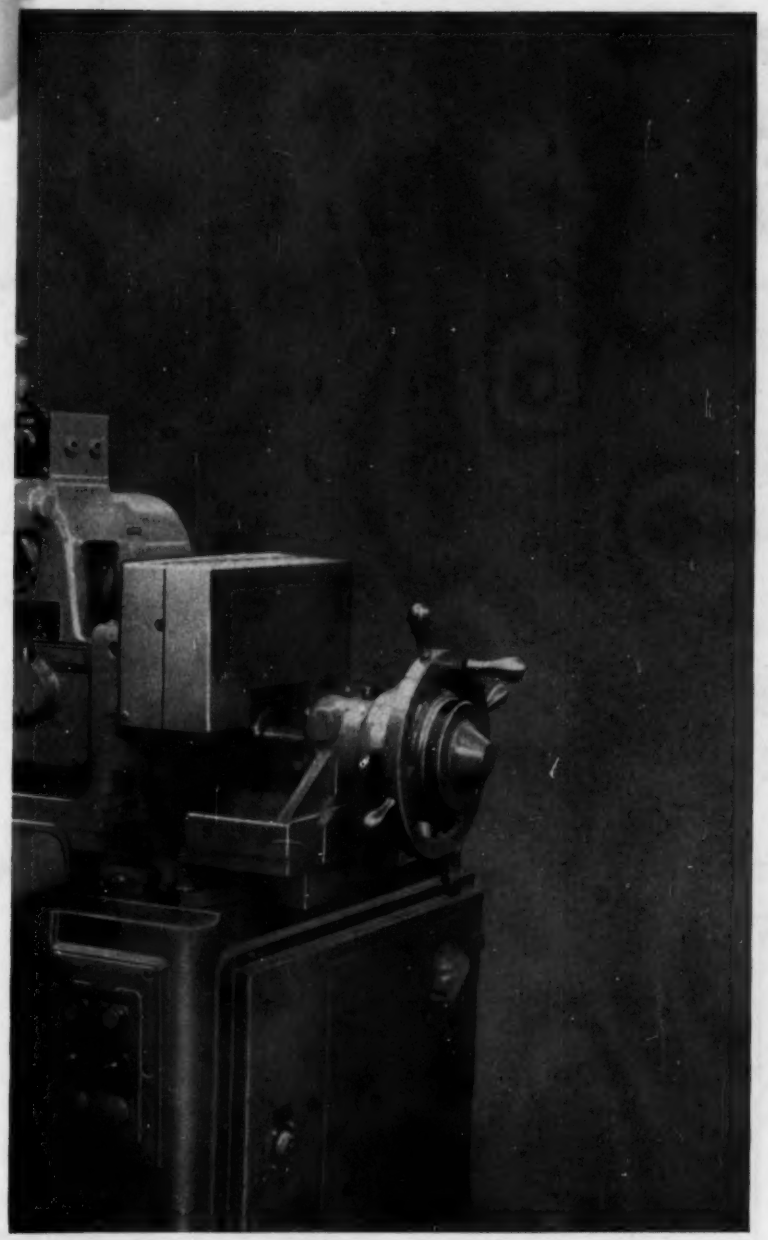
Close tolerances in vital parts are indispensable to MICRO SWITCH, suppliers of over 12,000 types of precision switches to home, industry, defense. This division of Minneapolis-Honeywell Regulator Co. gets accuracy and economy with VN Grinders.

.0001" on Thru-Feed—.0002" on Infeed are met by VN units in volume-grinding actuator shafts and plungers for snap-action switches. Specs for multi-diameter concentricity and micro-inch finish are routinely held at high outputs (1,000 to 2,000 parts per hour on thru-feed; 120 to 250 on infeed).

Fast, Smooth, Vibrationless Operation is designed into VN Centerless Grinders. Massive construction—well-coordinated components—lifetime-sealed spindle units. Result: strict control over work deflection . . . no warm-up, no chatter, no "creep." VN hyd. profile diamond dressing

VAN NORMAN

SPRINGFIELD 7, MASSACHUSETTS



PARTS TO .0001"

snap-switches at high output-rate

on both wheels, with cams for straight or multi-diameter parts.

Variable Speeds, Easy Set-Up, Operation Control. Two regulating wheel speed ranges: 13-80 and 140-830 RPM. Capacity 0-1½" dia. Optional: VN Crush Dressing Attachment.

Free Booklet—"Centerless Grinding"—valuable guide to high production, lower costs. For your copy, contact factory or your local distributor.

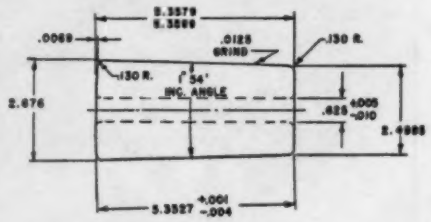
MACHINE COMPANY

A DIVISION OF VAN NORMAN INDUSTRIES, INCORPORATED

VN

Another typical Van Norman centerless grinder cost-saving application

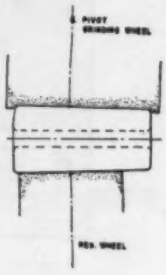
CUSTOMER'S PROBLEM:



To grind taper on large roller bearing, including blending radii on both ends. Parts to be green ground, hardened, then finish ground. Customer wanted to increase production as well as get more pieces per dress. Runout limit required: .0001" minimum. Finish to be 15 RMS or better. Previous operation produced approximately 17 pieces per dress on rough grind, and approximately 25 on finish grind. Stock removal was .020" to .025" on rough grind, and .005" on finish grind.

VAN NORMAN SOLUTION

Crush grinding the taper and radii simultaneously. Then finish grinding the radii, leaving .005" on the O.D. After heat treating—grinding the O.D. only, removing .005" of stock and holding a 15 RMS by diamond dressing the wheel.

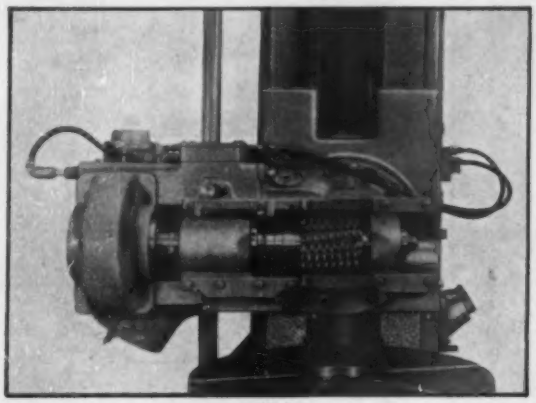


THE RESULT:

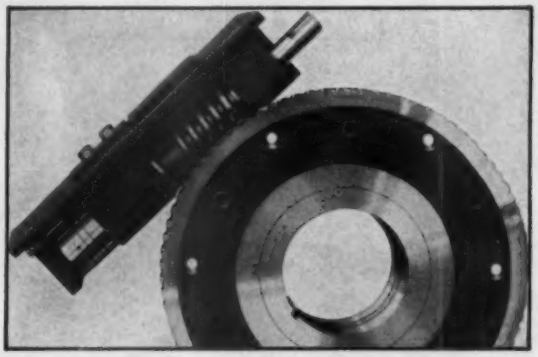
Rough grinding is performed in 30 seconds, with the removal of .020" to .025" on the O.D. and approximately .005" on the radii. Pieces per dress: 160, and without visible signs of taper or chatter. Finish grinding rate is 7.7 seconds per cycle, with 245 pieces per dress, and a 9 to 12 RMS held without runout or chatter. This exceptional accomplishment is one more example of how production efficiency can be stepped-up through the application of Van Norman Centerless Grinders.

2609

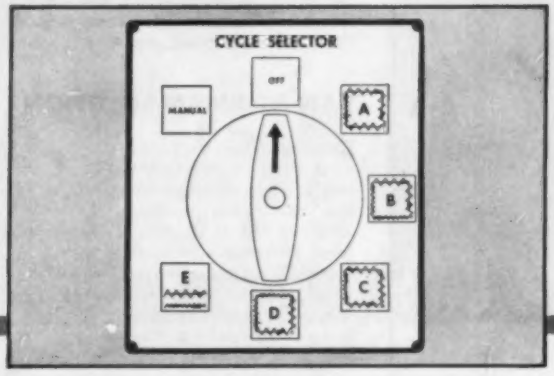
On G & E Gear Hobbers you can get features like these...



Automatic hob shift apportions wear over entire hob length, throughout roughing and finishing operations. Hob spindle bearings rigidly clamped during cut.



DUALEAD worm gearing assures accurate indexing under heaviest production, at high operating speeds. Worm thread design simplifies adjustment, improves backlash control, assures uniform motion in both directions of rotation.*



Automatic Quadcycle with rough and finish cycle option makes gear cutting completely automatic. Operator needs only to load work and push RUN button. Specific cycles in an operation are selected by a single setting dial.

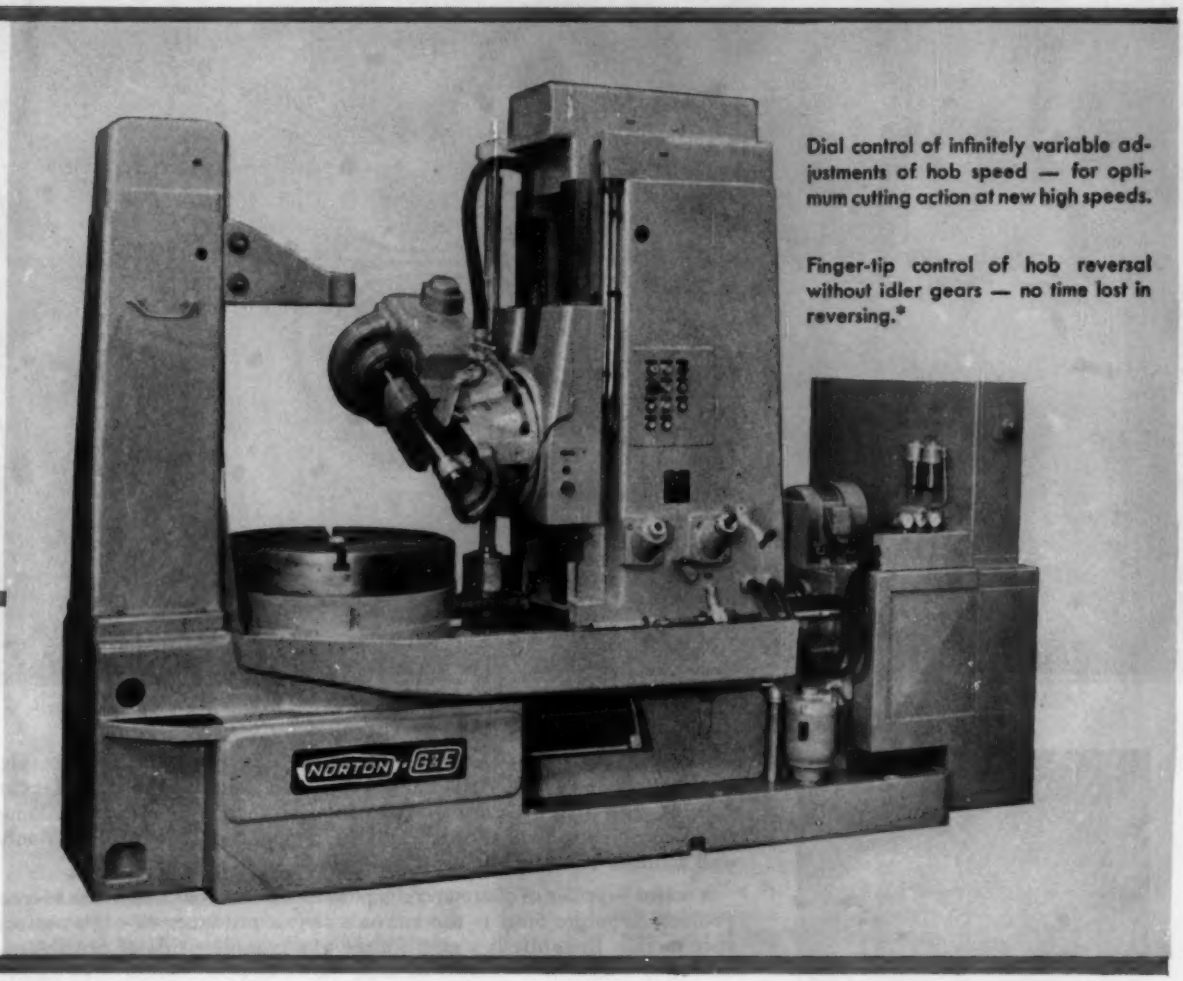
plus advantages like these...

- Hydraulic counter balance of hob slide — variable to meet cutting conditions — eliminates backlash and chatter, permits high hobbing speeds, lengthens hob life.
- Tracer-controlled crown hobbing accurately produces a total amount of crown within a few "tenths", per inch of face. Simple inexpensive template locates high point and amount of crown anywhere on gear face. Also applicable to highly crowned couplings.

*Standard equipment

NORTON PRODUCTS: Abrasives • Grinding Wheels • Machine Tools • Refractories • Non-Slip Floors — BEHR-MANNING DIVISION: Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

with everything under control!



Dial control of infinitely variable adjustments of hob speed — for optimum cutting action at new high speeds.

Finger-tip control of hob reversal without idler gears — no time lost in reversing.*

Outstanding accuracy has long established G&E Universal Gear Hobbers as the most dependable machines for practically every gear cutting application.

Precision performance is built into every G&E Hobber . . . with many advanced optional features like the ones described here . . . and with a simplified, control system that increases automatic, cost-cutting benefits in sustained high production.

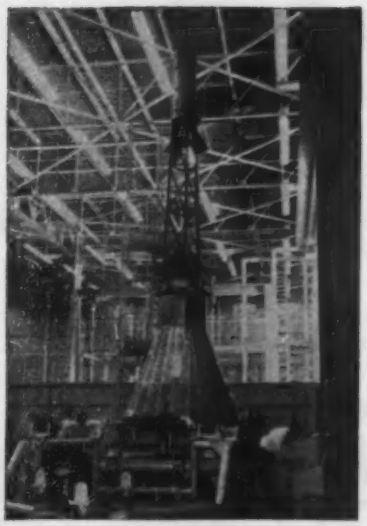
G&E Hobbers are made in ten sizes to produce gears from one inch to fifteen feet in diameter, with most features available on all.

For expert aid in selecting gear hobbers and other G&E machines, see your G&E distributor — or write to Norton Company, G&E Division, Worcester 6, Massachusetts.

NORTON
MACHINE TOOLS
Making better products
. . . to make your products better

MACHINE TOOL DIVISION: Grinding and Lapping Machines — **G & E DIVISION:** Shapers • Gear Cutting Machines

WITH MAN IN SPACE



McDONNELL AIRCRAFT CORPORATION, Lambert Field, St. Louis, Missouri, is prime contractor for the Mercury Capsule, under the direction of the National Aeronautics and Space Administration. Photo shows capsule similar to the FREEDOM VII used in successful launch.

The time: May 5, 1961, 10:34 AM, EDT. *The man:* Commander Alan B. Shepard, Jr., USN, Astronaut. *The event:* launching of the Mercury Capsule with man on a down range step into space. *The metal:* titanium for a combination of strength and lightweight in the vehicle's double wall stringer construction.

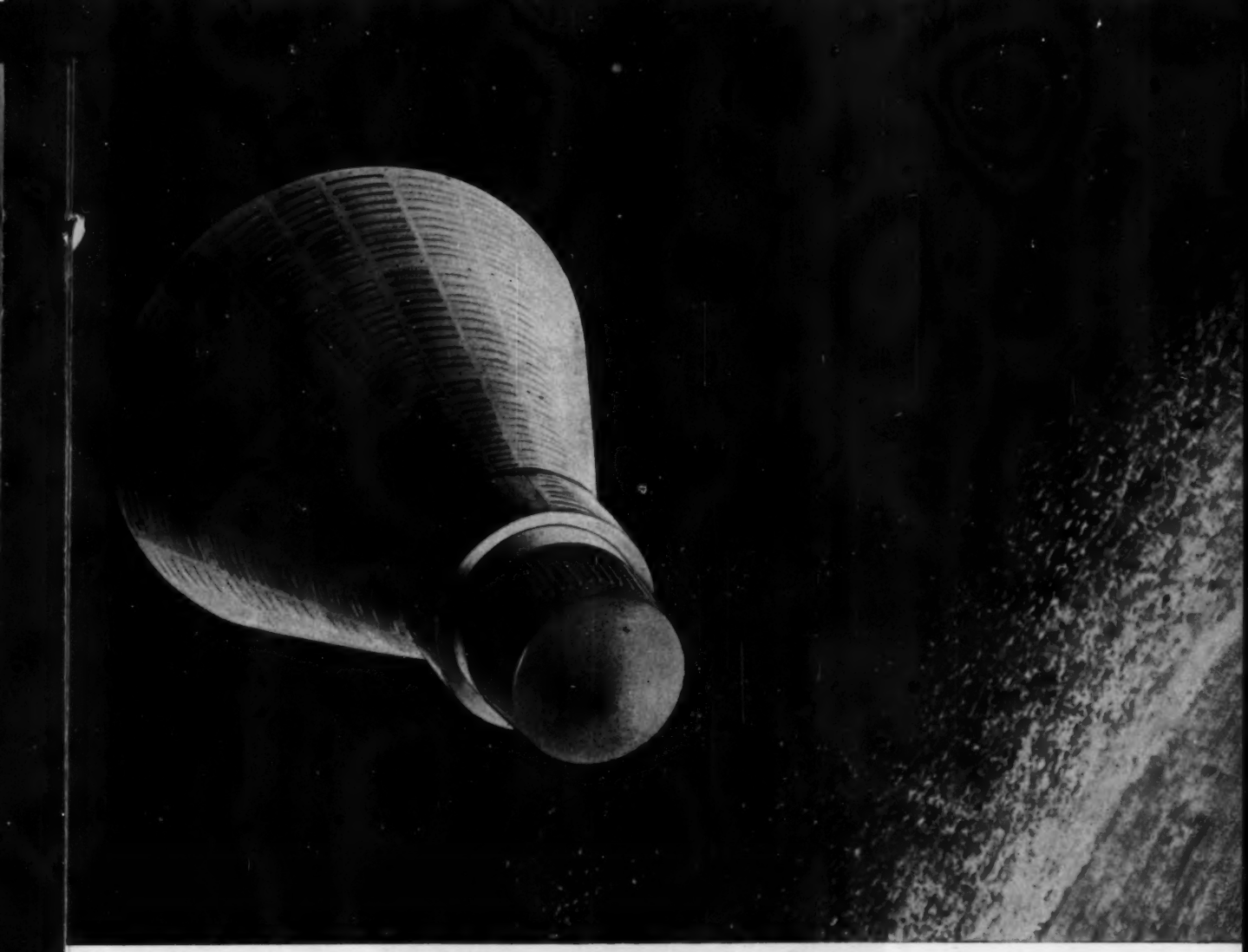
A major supplier of commercially pure AMS4901 titanium in the Mercury Project, Republic Steel is the nation's *largest* producer of high-performance metals. Republic is a new source of a complete line of precipitation hardenable stainless steels . . . the only source of continuous rolled stainless sheet up to 60" wide . . . the largest producer of stainless and alloy steels, and steels for cold extrusion.

To meet the challenge of space, Republic Steel is looking deep into the microstructure of steel . . . pulling facts from the heart of steel . . . aiming at fantastic new steels with tensile strengths even beyond 400,000 psi.

Republic's 3-Dimensional metallurgical teams—composed of mill, field, and laboratory metallurgists—help you select, apply, and process the most economical metals capable of meeting requirements. This is a confidential, obligation-free service. For additional information, contact your Republic representative or mail the coupon on the opposite page.

DESIGN ENGINEERS: Mail the coupon for a copy of Republic's new booklet, *Products For The Design Engineer.* Contains a useful Stainless Steel Selector Chart, and information on Republic High Strength Steels, Titanium, Electrical Steels, Vacuum Arc Melted Steels, and other high performance metals.

CIRCLE 269 READER SERVICE CARD



VACUUM ARC MELTED METALS . . .

Processed into billets, bars, plates and sheets, strip, or wire, Republic Vacuum Arc Melted Metals are produced in 4,000- to 20,000-pound ingots. The consumable electrode vacuum-melting process improves tensile strength, ductility, fatigue life, and performance at high and low temperatures. Precise control reduces nonmetallic inclusions and harmful gases. Republic helps you select the vacuum-melted metal best suited to requirements: constructional alloy steel, high strength alloy steel, bearing steel, stainless steel, super alloy steel, titanium, or special carbon steel.

REPUBLIC PH STAINLESS STEELS . . .

Republic PH 15-7 MO* for missiles and aircraft offers high ultimate tensile strength with excellent mechanical properties to 1000°F. Republic 17-4 PH* for shafts, gears, pins, and other components requires only a one-hour heat treatment at 900°F to develop its full strength (ultimate tensile strength to 200,000 psi). Republic 17-7 PH* for pressure tanks, bellows, springs, and other applications provides better corrosion resistance than the hardenable grades of chromium stainless. Send for PH Stainless Steel Booklet.

*Licensed under Pat. Nos. 2482096, 2505763 and Trade Mark of Licensor.

REPUBLIC STEEL

REPUBLIC HAS THE FEEL FOR MODERN STEEL

CIRCLE 270 READER SERVICE CARD

REPUBLIC STEEL CORPORATION
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1441 REPUBLIC BUILDING • CLEVELAND 1, OHIO

Please send PRODUCTS FOR THE DESIGN ENGINEER Booklet
I would also like more information on:
- ☐ Republic Titanium
- ☐ Vacuum Arc Melted Metals
- ☐ Republic PH Stainless Steels

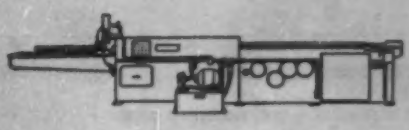
Name_____ Title_____
Company_____
Address_____
City_____ Zone____ State_____

. . . want production?

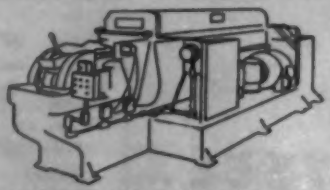
Hand loaded, this small combination

This special high-speed 2-ton Lapointe UVHS Universal Hydraulic Single Ram Broaching Machine operates at 50 f.p.m. in broaching commutator slots from the solid. A built-in feature of the fixture, radially positions the part, which is pushed through a pot type broach. The machine has a 24" stroke, and is built for surface and internal broaching. (Also available in 4-ton capacity.)

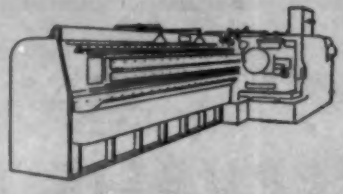
Lapointe-built Broaching Machines are available in hydraulic and electro-mechanical drives.



60" STROKE HORIZONTAL, ELECTRIC



CH CONTINUOUS BROACHING, ELECTRIC



SRHE SINGLE RAM HORIZONTAL, ELECTRIC

push/pull **LAPOINTE** BROACHING MACHINE

broaches 10 slots on this commutator at rate of **720** complete parts per hour!

In exactly 5 seconds, in one stroke, this compact Lapointe Broaching Machine broaches 10 equally spaced slots .015″ wide (±.002″) on the O.D. of the commutator shown above. And that's **actual production,** based on 80% efficiency of the machine!

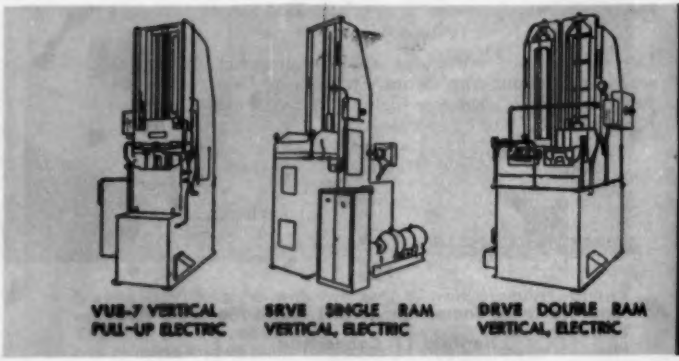
Such results constitute a good investment, for such a small, relatively inexpensive broaching machine. This is another instance where Lapointe-Broaching has paid off . . . handsomely!

Perhaps you have a metal-removing problem that can be solved by broaching. If so, you should investigate now, so you can put your own plant on a more competitive basis. Costs can come down fast, while at the same time your quality goes up — through better surface finish and elimination of rejects. An experienced Lapointe Field Engineer will gladly call on you, on request.

THE LAPOINTE MACHINE TOOL COMPANY

HUDSON, MASSACHUSETTS • U.S.A. *In England: Watford, Hertfordshire*

THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHING MACHINES AND BROACHES



VUB-7 VERTICAL PULL-UP ELECTRIC | SRVE SINGLE RAM VERTICAL, ELECTRIC | DRVE DOUBLE RAM VERTICAL, ELECTRIC

LAPOINTE

known to be the best in

BROACHING

IMPROVES RELIABILITY OF PRESS FITS... CUTS COSTS ...without A Penny Invested in Equipment!

Simply apply a few drops of LOCTITE Sealant to press fit assemblies. Look at these production assembly advantages:

- Greatly increases reliability of interference fits and other methods of metal-to-metal assembly.
- Requires no expensive equipment—the plastic bottle is the applicator. Can be used for automatic or mass application with simple "around-the-shop" parts.
- Increases allowable tolerances—reduces machining costs.
- Reduces materials costs—minimizes design requirements.
- Facilitates assembly of delicate parts—reduces danger of deformation.
- Facilitates proper concentric fit of mated parts in line-to-line fits—this liquid-turned-to-solid mates parts better than any metal-to-metal contact possible.

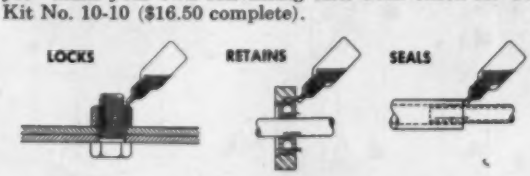
. . . and parts can be disassembled with standard tools and techniques.

WHAT IS LOCTITE? LOCTITE Sealant is a penetrating liquid resin with low viscosity that hardens when confined between closely fitted metal surfaces. It "wicks in" between the most closely mated of matched precision surfaces and hardens into a strong, heat-, oil-, grease-, solvent- and vibration-resistant bond. LOCTITE completely fills the space between the surfaces . . . adds its sheer strength to that of the press fit. There are no solvents to evaporate —no catalyst to mix.

On the production assembly line and in other areas, too, the LOCTITE Method replaces and improves many different mechanical means of *locking—retaining—sealing*. LOCTITE Sealant has already brought these benefits and savings to such leading companies as:

Bendix Corporation
Consolidated Diesel Electric Corp.
The Maytag Company
Westinghouse Electric Corp.
General Dynamics Corporation, Electric Boat Division
Reeves Instrument Corporation
Norge Division, Borg-Warner
Remington Rand Univac
Philco Corp.—Government & Industrial Div.
General Electric Company
Raytheon Mfg. Co.
McDonnell Aircraft Corporation
Veeder Root, Inc.

Details on your particular application bring immediate response from our Application Engineering Dept. Or, better yet—make your own convincing test. Mail check for Test Kit No. 10-10 ($16.50 complete).



LOCTITE® SEALANT

American Sealants Company • 121 North Mountain Road Hartford 11, Connecticut

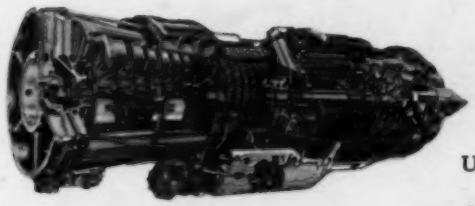
Production Pointers

from GISHOLT

More cost-cutting IDEAS—
to help you

NEW BALANCING METHODS SAVE FOR UNITED AIRLINES

Two units, one automatic . . . one double-tooled, speed maintenance balancing of jet engines . . .



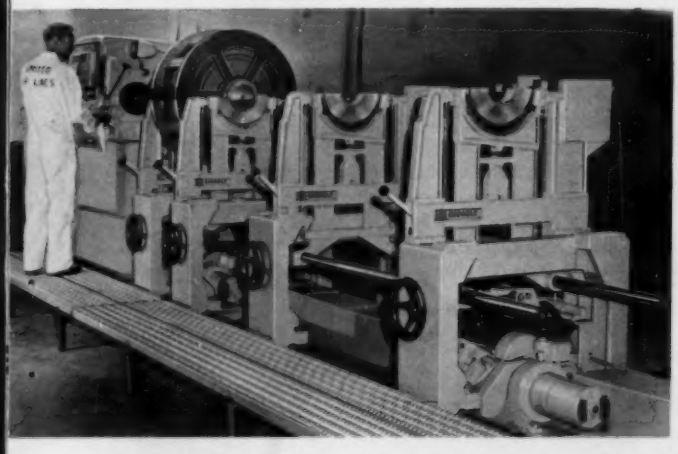
JT-3 Jet Engine

Unbalance causes vibration, and trouble . . . especially in the rotating heart of a jet engine. To assure continued safe operation, jet engines must be overhauled periodically. This installation in United Air Lines' Turbine Overhaul Facility, at San Francisco's International Airport, shows how low cost and peak efficiency can be obtained in maintenance balancing operations.

United Air Lines uses Pratt & Whitney JT-3C6, JT-3C7, JT-4A3 and JT-4A9 engines. Two Gisholt Balancers were selected for this installation. They had to comply with rigid performance tests based on Pratt & Whitney's specs. They also had to offer fast changeover, low tooling costs, and capacity for all parts and assemblies for all four engines.

A vertical 2SV1 Balancer is used for separate components requiring single plane (static) balancing. During rotation the 2SV1 automatically remembers angle and shows amount of unbalance in terms of the correction method used. After rotation, the operator indexes the part until a light flashes, indicating where correction should be made. All seven stages of a low compressor can be balanced, corrected and inspected in less than one hour.

Gisholt 2SV1 Balancer arranged to balance front compressor part. A safety clamp device which fits over the center of the part has been removed to show detail. Power loader moves work from conveyor to spindle adapter. During work rotation operator notes amount . . . selects corrections weights. He stops rotation, indexes work to angle and makes correction. Work is rotated again to inspect for balance. Total time—2 minutes.



Gisholt UJP Balancer with two sets of work supports. Shown with a JT-3 Rear Compressor assembly in one set of supports. The other set has been readied for a different type of part. Setups can be made for two plane balancing, or single plane (static) with a check for moment unbalance.

Even though components are balanced separately, tolerances accumulate during assembly. Complete units must also be balanced in their own bearings. Some weigh as much as 1500 lbs. This work is done on a Gisholt UJP Balancer. Special foundations are not required although vibrations as small as .000007″ can be measured and located.

The UJP Balancer has two complete sets of work supports. One can be set up for a new part while the other is in use. Non-operating time is at a minimum. Two-machine production is obtained at 1½ times the original cost of a single machine.

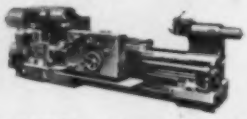
Here are typical balancing times: high turbine—5 minutes; low turbine—½ to 1 hour; high compressor—½ hour; low compressor—1 to 1½ hours. This includes loading, location, measurement, correction and inspection for balance.

Gisholt Balancers save time, offer top accuracy, eliminate guesswork. Special UJP Balancer gives two-machine production at cost and floor space of 1-1/2 units.

For information on Balancers, circle No. 750 on inquiry card.

HARNISCHFEGER SAVES UP TO 30 MINUTES PER PART WITH GISHOLT CRI-DAN

. . . Single-point tools thread tough steel to high accuracy . . . fine finish



Want to cut costs from 30% to 80% on the toughest threading jobs in your plant? Then study this setup at Harnischfeger Corporation, Milwaukee, Wisconsin. It shows how you can use inexpensive single-point carbide and high speed tools to produce top quality threads, simple or complex, automatically!

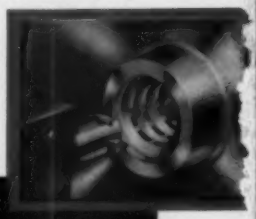
Harnischfeger produces a wide variety of industrial equipment requiring many types of threads in many different materials. The Cri-Dan technique was investigated as a possible means of reducing time and tooling costs of conventional methods. As a result, a Gisholt Cri-Dan E Automatic Threading Lathe was installed to handle a group of power hoist parts. Work included external threading on 15 different pinion shafts and worms and internal, 2-start threading on 8 different gear blanks.

The savings obtained on the 10″ steel gear blank setup shown are typical. It requires a .250″ deep, 1″ lead, 2-start Acme thread for a length of 2⅛″ in the 2″ bore. Brinell hardness is 269-302. Five taps were previously used, requiring 37 minutes to complete the thread. On the Cri-Dan E, work is chucked once . . . in a 12″ 3-jaw air chuck. The automatic cycle is started and the single-point tool completes the 2-start thread in 100 passes. Tool infeed diminishes on the last 6 passes providing a 125 micro-inch RMS finish. Floor-to-floor time is only 9 minutes.

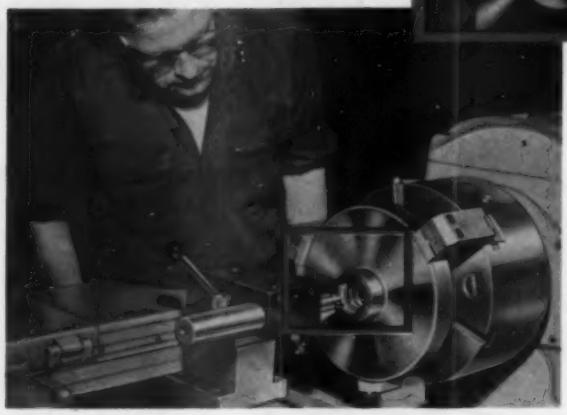
Cri-Dan technique saves 30 minutes on this part. Tool costs and setup times have been reduced and a better quality thread and finish is obtained. Time savings average 60% on all parts handled.

For information on Cri-Dan E, circle No. 751 on inquiry card.

Close-up of 2-start thread and tooling. ▶

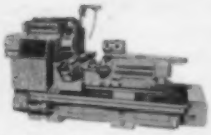


Single-point tool produces two-start thread in only 9 minutes f.t.f. compared to 37 minutes by previous methods. Inexpensive tooling, fast setup and versatility to handle all types of threads make the CRI-DAN pay off in any shop . . . large or small. ▼



AUTOMATICS DOUBLE PRODUCTIVITY...CUT TIME 65% AT BODINE ELECTRIC

. . . Six automatics replace 8 manual turret lathes, handle increased production . . .



How much could you save if you had Automatic Ram Turret Lathes in your shop? The results obtained by Bodine Electric, Chicago, Ill., provide some revealing answers to this question.

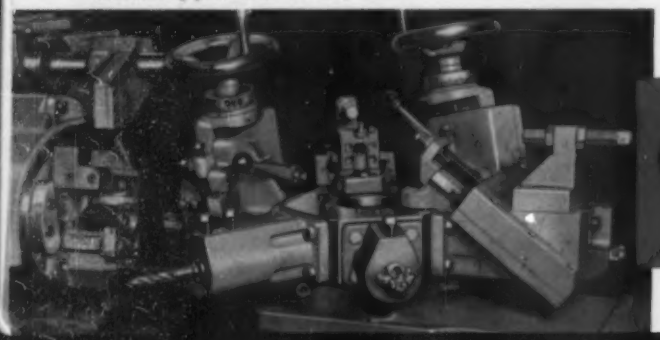
Bodine Electric is a well-known manufacturer of fractional h.p. motors. Components, such as worm gear housings, end shields, gear blanks, and gear shafts, were being machined on hand operated turret lathes. Analysis showed that greater efficiency was needed to keep costs in line, maintain the profit ratio and meet an anticipated production increase.

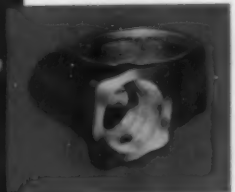
Various automatic lathes were evaluated. The Gisholt MASTERLINE Automatic Ram Turret Lathe was selected as the machine that would best meet their needs.

Here are the results of this important decision. Six machines, purchased over a period of time, do work previously done on 8 manual turret lathes and handle the increased production too . . . now over 360,000 units a year. Based on previous methods, floor space requirements were cut in half. The new Gisholt Automatic Rams gave them the capacity and versatility of a turret lathe with a fast automatic cycle, reducing operator effort to loading, starting the cycle and unloading. On bar work even less is required. Each operator handles two machines doubling individual productivity. Standard tools, already available could be used. Except for programming the cycle, setup methods were unchanged. Setup times were almost as low as for manual turret lathes.

Machining time was cut an average of 65% on *all* parts handled. Uniform quality, longer tool life and consistent production rates were other plus factors . . . with each automatic ram costing less than 1½ times the initial cost of a manual turret lathe!

Automatic Ram Turret Lathe tooled to machine flange end of worm gear housing.
Fixture adjusts for various sizes. Cycle includes use of multi-diameter cutter, drill, and automatic slide tools that quickly adjust for other sizes. Reverse feed provides close tolerance, fine finish needed. Time . . . only 1.3 minutes f.t.f. compared to 3 minutes by previous method.



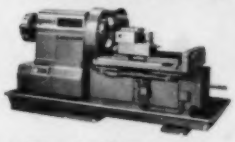


Six automatics do the work of 8 manual lathes and meet increased production requirements. Each operator handles two machines. Time cuts average 65% on all work handled. Fast setup and automatic cycle up profits on small lots or long runs.

For information on AR, circle No. 752 on inquiry card.

PRE-SET TOOLS SIMPLIFY GROOVING FOR CHICAGO PNEUMATIC TOOL COMPANY

. . . One basic setup covers three operations on wide range of work



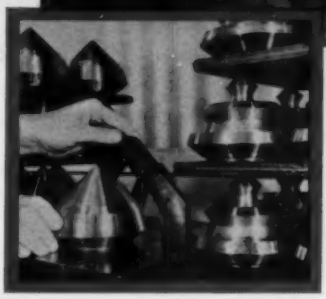
If deep grooving is one of your production problems, you'll want to study this setup. It shows how Chicago Pneumatic Tool Co.'s Oil Tool Div., Fort Worth, Texas, uses pre-set tooling and Simplimatic versatility to cut costs.

Workpieces are AISI 4815 steel oil well cutter bit forgings. Over 12 different sizes, from 5⅜" to 12¼" are produced. Previous blanking operations are handled on Gisholt No. 12 Automatics. Grooving work, on the three different cutter types made from each size blank is done on Gisholt Simplimatics.

Tooling is designed for fast changeover. Four sets of special chuck jaws handle all the part sizes. Tool bits are bolted in milled slots on spacer plates and pre-set in the tool room for each part type and size. These are quickly mounted on the slide tops as needed.

On the grooving setup shown, speed is 284 RPM . . . feed is .0045". Both slides operate at the same time, completing the operation in one pass. Although material removal approaches 15-20%, time is only 2.5 minutes, f.t.f.

The Simplimatic was selected because it offered a large platen, upon which standard independent slides could be permanently mounted to cover the entire work range. The slides have swivel bases for speedy angular adjustment. Slide tops have micrometer adjustment, in and out, to minimize tool overhang. This provides rigid tool support for maximum metal removal using a 60 HP motor and long tool life (over 250 parts per grind). Both slides operate simultaneously, keeping cycle time at a minimum.



Basic setup handles grooving operations on cutter bit forgings from 5⅜" to 12¼". Pre-set tools on riser plates speed changeover. Gulfcut H.D. Soluble Oil Coolant reduces maintenance costs, combines with rigid tooling to provide finer finish, longer tool life and maintain .005" tolerance on cone heights and groove depths.

Simplimatic offers capacity and versatility for wide work range . . . power and rigidity for maximum metal removal and minimum machining times. Pre-set tools cut changeover time . . . increase productivity.

For information on Simplimatic, circle No. 753 on inquiry card.

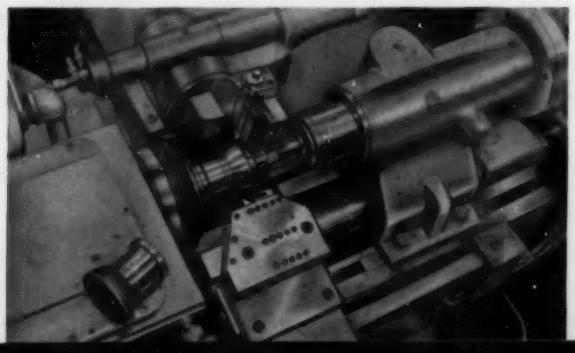
HOW TO SPEED SPHERICAL TURNING OF BALL VALVE PARTS

. . . Generating head on No. 12 handles over 30 different sizes . . .

Here's a real time-saving setup for generating spherical diameters. Shown on a Gisholt No. 12 Automatic Chucking Lathe, it combines spherical turning, blending, facing and chamfering into one fast, automatic operation.

A wide range of ball valve parts is handled by a spherical generating head on the rear independent slide. Sizes start at ¾". The generating tool holder has micrometer adjustment for up to 5" diameter work.

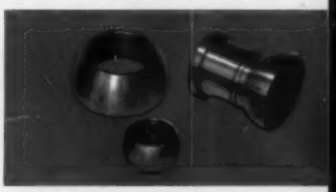
Rough part at left and finished part held on expanding mandrel. The 3.500" spherical diameter is generated while front tools blend, face to length and chamfer. Time . . . only 1.3 minutes f.t.f.



Tooling is designed for quick changeover. An air operated expanding mandrel and a threaded draw bar fixture were supplied to handle parts with smooth or threaded bores. Expansion sleeves, stop collars and drawbar extensions compensate for different lengths and bore diameters. An open-type tool block on the front carriage permits quick adjustment of replacement of other tools.

This is the sequence of the part shown in the illustration. It is held on an expanding mandrel with tailstock support. The 3.500" spherical diameter is generated at .006" feed, 390 SFM. An 80 micro-inch RMS finish is obtained. At the same time, front carriage tools blend at the base of the ball, face to length and chamfer. Time . . . only 1.3 minutes f.t.f. . . . compared to over 3 minutes by previous methods.

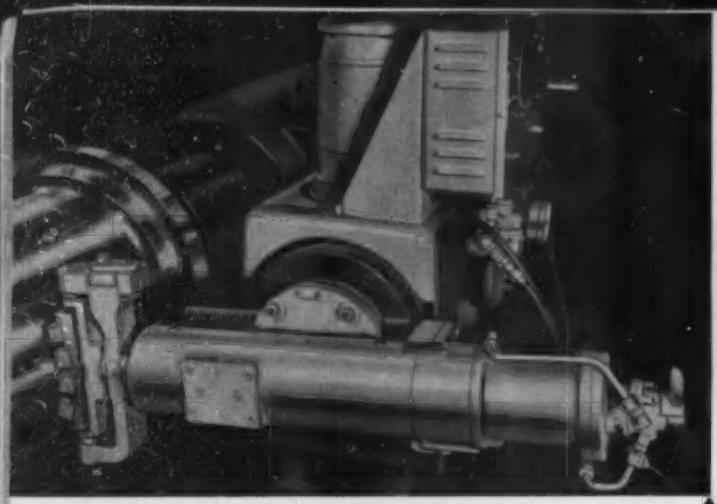
A spherical generating head can also be supplied for both rough and finish passes during the automatic cycle.

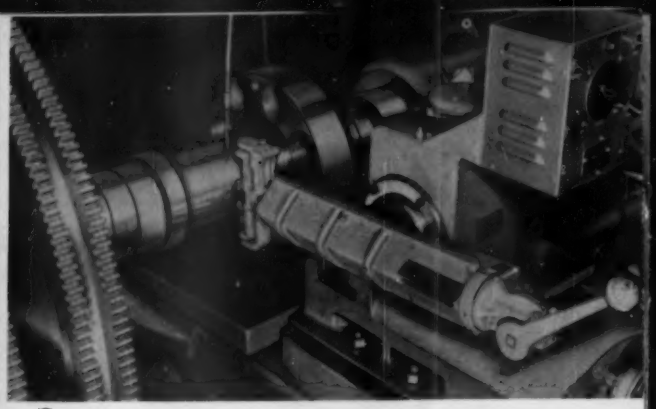


Representative parts showing variety of spherical surfaces machined with this setup. Note that parts have both smooth and threaded bores. The 2" ball at far left is completed at 390 SFM in only .8 minutes f.t.f.

Spherical generating head turns O.D.'s up to 5" . . . meets close tolerance, fine finish requirements. Fast automatic cycle on No. 12 cuts machining time over 50%.

For information on No. 12, circle No. 754 on inquiry card.





Model 62 Attachment used in Small Turbine Department saves $644 a year on labor costs alone! With traverse provided by tool post carriage, it handles any length within capacity of lathe.

Model 73 Attachment used in Large and Medium Turbine Department handles diameters to 60". Saves 7 hours on large journals . . . provides 5 micro-inch RMS finish.

WESTINGHOUSE CUTS 7 HOURS ON ROTOR JOURNALS WITH SUPERFINISH

. . . Low cost attachments eliminate grinding, provide better surfaces in less time . . .

Looking for ways to reduce finishing costs? These setups, at Westinghouse Steam Division, Lester Plant, South Philadelphia, Pa., show how you can do it with Superfinish.

Here, low-cost Superfinish Attachments are used for journals on large, medium and small turbine rotors. The attachments are portable with adapter plates that permit mounting on the tool post of any lathe. The rotors are held between centers. Longitudinal feed is provided by the tool post carriage.

Previously, rotor journals were turned .030" oversize and ground. The best finish obtainable was 15 to 20 micro-inches RMS. Now, journals are turned .003"-.005" oversize, then Superfinished to 5 micro-inches RMS.

Savings? Grinding of large journals used to take 8 hours . . . Superfinish takes only 1 hour. The Superfinish Attachments handle new rotors and also refinish other journals damaged in service without having to return the spindles to the factory. Cost analysis showed that one attachment in the Small Turbine Department saved $644 a year on labor costs alone . . . a 30.4% return on the original investment!

Superfinish saves time, provides better surface. Eliminates peaks...leaves plateaus and valleys for greater bearing area. Corrects part geometry...does not change surface hardness ...assures longer service life.

For information on Superfinish, circle No. 755 on inquiry card.

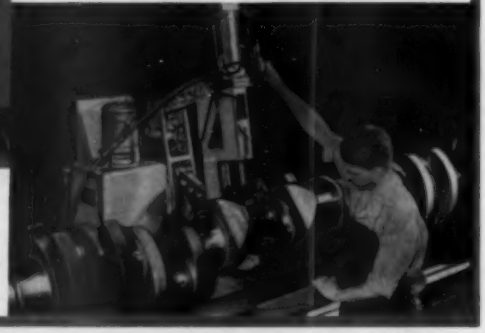
MORE JOBS

. . . Proof that Gisholt MASTERLINE Superfinishing Attachments can be used to advantage in your own operations.

Off-set stoneholders are used for straight or tapered internal work. Model 60 Attachment Superfinishes air cylinder bore in only 3½ minutes. Ground surface is reduced from 30 to 5 micro-inches RMS.

Mounted on a grinder, Model 62 Attachment combines operations on pump piston rods. Parts are ground to size, the grinding wheel retracted and the attachment used to expose true base metal and provide a smoother, 5 micro-inch RMS finish.

Previously, main, pin and journal bearings were chrome plated .015" oversize before finish grinding. Model 73 Attachment with latch-on follower-arm handles all surfaces. Superfinish required chrome plating only .002" oversize saving $15 per surface on chrome plating alone!



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MEDIA BUYERS' FACTS OF LIFE

WHAT IS THIS THING CALLED AUDIENCE IDENTIFICATION?

FOR OUR MONEY, you can't pigeonhole industrial businessmen into neat little groups with an exclusive concern for one technical process, one end product, one kind of equipment. It would be akin to classifying your home as a portion of the peanut butter market or the toothpaste market -- and then trying to reach your wife with a different publication for each item. In metalworking, the field we know best, things just aren't like that.

METALWORKING IS BASICALLY A MANUFACTURING INDUSTRY. Thus, its primary mission is turning out a good product, then selling and distributing it at a profit. Our particular editorial concern is with manufacturing. Since this is a natural, clearly-defined and easily-identified area of activity, manufacturing men are the target audience for AM/MM. Accordingly, we concentrate on them in both editorial and circulation. (We leave the bookkeepers, salesmen and purchasing agents for somebody else. We have our hands full with manufacturing.)

Within metalworking, our man can be anybody -- as long as he's concerned with manufacturing. Whether he's behind a mahogany desk, a drawing board or carrying a clipboard on the shop floor, if he's interested in manufacturing, he'll find AM/MM of value. There are good reasons why.

ALL METALWORKING PLANTS, no matter what their product, use similar equipment, materials and techniques. Likewise, manufacturing men in these plants share common problems with men in other metalworking plants. Even more salient: all production processes within a plant are inter-related, and for a manager to function efficiently he must know and understand all other operations in the plant.

A metalworking publication, as we see it, must serve all kinds of metalworking plants to serve any one. It must serve all types of manufacturing men in these plants to serve the individual.

AMONG METALWORKING PUBLICATIONS, ONLY AM/MM DOES THIS. Our audience follows the functional outlines of our business and has not been artificially contrived for the sake of a palatable sales story. Any AM/MM salesman can give you the statistics but, in essence, this is our story: if your product can be used in metalworking manufacturing, your advertising belongs in AM/MM, a manufacturing man's magazine in a manufacturing industry.

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LETTER from the PUBLISHER

Obsolescence Is Choking Us

The lead article in this issue presents the latest estimates of our editors on the obsolescence of metalworking equipment. It represents the judgment of experts on what has happened to the manufacturing efficiency of America since AMERICAN MACHINIST/METALWORKING MANUFACTURING conducted its Eighth Inventory of Metalworking Equipment in 1958.

A sorry picture . . .

This is indeed a sorry picture. Here we are the leading industrial nation of the world. We are engaged in a competition to the death with the forces of darkness, yet we've allowed our production equipment to deteriorate and become even more obsolete during the past three years. The chief protagonist of these forces of darkness, the Soviet Union, on the other hand, has been busily engaged in modernizing its plant and equipment.

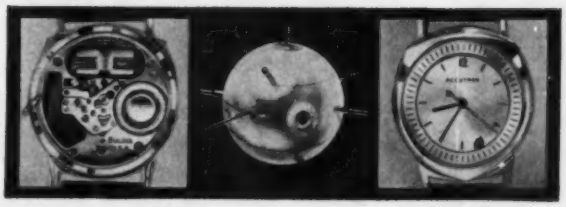
To win this battle . . .

If we are to win this battle, and win it we must for it means survival, we have to act. No longer can we afford to operate under an archaic tax system that provides incentive to hang on to over-age equipment. No longer can you, as a manufacturing man, afford to put off investing importantly in modern, more efficient machine tools and other up-to-date production equipment. In 1958, we published a special report entitled "Plan '59—Modernize Now For Growth and Profits." This report contained a wealth of specific data on production savings to be gained by investing in modern equipment. You can use it to demonstrate to your management that failure to invest in the latest equipment is costing your company money. We still have a limited supply of reprints of this report. If you would like a copy, write me.

George Reppert

THIS IS ACCUTRON†®

† TIME-KEEPING Great interest has been focused on the new Bulova ACCUTRON timepiece, a watch described by Bulova as "the first instrument of the space age you can wear and use! . . . It doesn't even tick. It hums! First timepiece guaranteed accurate on your wrist." "Accutron" is Bulova's trademark for timekeeping devices. It stands for new standards of accuracy.



® GAGING We welcome Bulova's use of the word "Accutron" as a compliment to the term already distinguished in the field of precision measurement. "Accutron," a Sheffield trademark for gaging devices, has long been a symbol of unquestioned accuracy and reliability. The Sheffield Accutron amplifier, for example, can show dimensions down to two and a half millionths of an inch, and is readily adaptable to an almost unlimited range of electronic gaging heads and tooling, for checking almost any dimension, shape, or relationship. Feathertouch gaging heads (with pressures as low as 5 grams) permit reliable measurements of soft or easily distorted parts. Accutron instruments are in constant service in Sheffield's own Eli Whitney Metrology Laboratory.

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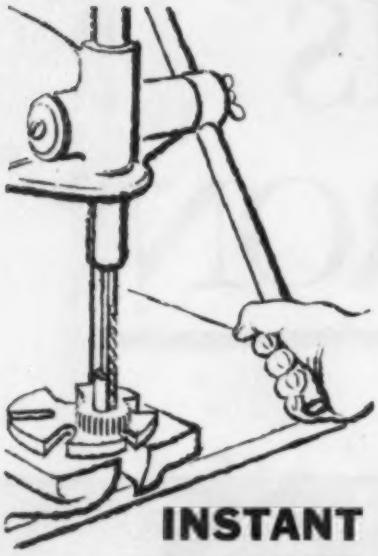

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LETTERS

to the editors

330 W 42nd St, New York 36, NY

Can't Search Pending Patents

Dear Sirs:
We have read the article entitled, "Patents—a technical gold mine!" (*AM/MM*—Mar 20 '61, p140) and have found the description of patent searching techniques to be quite well done.

However, the bold-face paragraph leading off the article appears to be somewhat misleading in that it indicates that it is possible to search both existing patents and also pending patent applications, whereas in fact, pending patent applications are held in strict confidence by the Patent Office.

The practical consequence of the situation is that every patent search will be approximately 2 to 4 years obsolete (this is the average period of pendency of a patent application) at the time it is completed.

This situation could be remedied to a great extent, without violating the interest of the inventor in having his patent application examined in confidence, by substantially increasing the budget of the Patent Office to provide for more examining personnel. This conceivably could reduce the period of pendency from the present 2 to 4 years to approximately one year.

T A Meehan
Patent Department
Surface Combustion
Toledo, Ohio

We Apologize

We very much regret that the name of the Hooker Chemical Corp was inadvertently omitted from the list of companies that had contributed material and illustrations for our Special Report on "Vapor Degreasing" (*AM/MM*—Apr 17 '61, p127). Hooker was a major contributor, and we hereby acknowledge their generosity in supplying us with so much material—Ed.

Mistaken Identity

Dear Sirs:
Arthur D Little, Inc, has been retained by the Glacier Metal Co Ltd of London to license in the United States the Glacier patents

SHOPMATES

N. Jarvis

I CAN SEE IT !!! RIGHT THERE ON THE SHELF ... BUT HE SAYS IF IT AIN'T IN THE CARD FILE HE AIN'T GOT IT !!
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Air conditioning, appliances, electronic, communications, electrical apparatus, fans, blowers, machine tools, materials handling, panelboards and switch boards, prime mover, pumps, compressors and general machinery . . .

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On these pages are shown some of the many components developed and manufactured by Westinghouse specifically for OEMs. Here is one single source for technical assistance, manufacturing and stocking of all of your electrical needs Use this *total* service to solve your design and manufacturing problems now. Call your local Westinghouse Sales Engineer or write Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pa. *You can be sure . . . if it's Westinghouse.*

J-00163

Westinghouse

NEW

Black Line control transformers

Especially designed for machine tool control. Compact design plus Westinghouse's exclusive "BONDAR" Class "A" insulation combines quality and minimum space in Black Line Transformers. Offered in a wide range of voltage ratings—.025 kva through 5 kva with a 55° C. rise. For details, write for Bulletin B-7879 to Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pa. *You can be sure . . . if it's Westinghouse.*

J-00170

that relate to Teflon-impregnated bearings.

We have issued an exclusive license to Garlock, Inc, covering a material composed of lead-Teflon mixtures impregnated into a sintered bronze matrix on a steel backing. This material is currently being marketed by Garlock under the trade name DU.

The Eaton Manufacturing Co of Cleveland, Ohio, has the exclusive right to the lead-Teflon impregnation of sintered parts, completely apart from the scope of the Garlock license.

I call your attention to your "Materials" page (*AM/MM*—Apr 17 '61, p105) in which you identify Eaton with the type of bearing material being commercialized by Garlock.

Walter J Cairns
Arthur D Little, Inc
Cambridge, Mass

We are sorry about this mixup, and we appreciate Reader Cairns' clarification—Ed.

Magnetic Forming a Hit

Dear Sirs:
Congratulations on your excellent article entitled "Magnetic Forming" (*AM/MM*—Mar 20 '61, p117).

This is the sort of thing that makes AMERICAN MACHINIST/METALWORKING MANUFACTURING indispensable.

Horace Frommelt, *director*
Manufacturing Research Center
Ferro Powdered Metals, Inc
Salem, Ind

AM/MM

"Act nonchalant!"

NEW

BF relay

Saves space, cuts cost, is specially engineered for machine tools. 50% less space, front accessible terminals, low temperature operation, lower installed cost, long life. In both 4-pole and 8-pole frames, rated at full load current of 6 amps/300 volts a-c 60 amp inrush. Write for Bulletin B-7345, Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pa. *You can be sure . . . if it's Westinghouse.*

J-00165

Westinghouse

NEW

AB-I breakers

Often cost less than safety switches yet are better, smaller, lighter. AB-I Breakers for motor circuit protection are installed faster, approximately half the size, ⅓ the weight. Machine operator can "re-set" and contacts can be visible. Write for Bulletin B-7350 and be convinced—Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pa. *You can be sure . . . if it's Westinghouse.*

J-00164

NEW

Magnaflow electromagnetic drives

Economy, less space, 17:1 speed range or more. Includes everything needed for stepless wide-range speed control from a-c power. Has a-c motor drive, electromagnetic coupling, regulating exciter, operator control station plus variety of modifications to suit special operating conditions (¼ to 700 hp). Write for B-7875, Westinghouse Electric Corp., Box 868, Pittsburgh 30, Pa. *You can be sure . . . if it's Westinghouse.*

J-96167

Westinghouse

NEW

TEFC d-c motor

For fastest d-c motor response! New totally-enclosed, fan-cooled Life-Line H d-c motor with 75% less armature inertia, 500% commutating ability for acceleration results in faster stops, quicker stops, faster reversing. 30 hp rating accelerates from 0 to 1750 rpm—fully loaded—in 1.1 sec.; similar response in ratings 1 to 75 hp and higher. Write Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pa. *You can be sure . . . if it's Westinghouse.*

J-96168

CALENDAR

American Gear Manufacturers Association — Annual Convention, June 4-7, The Homestead, Hot Springs, Va.

Society of Automotive Engineers —Summer Meeting, June 4-9, Chase-Park Plaza Hotel, St Louis, Mo.

Society of the Plastics Industry—National Plastics Exposition and Conference, June 5-9, Coliseum and Commodore Hotel New York, NY.

Instrument Society of America—Instrument-Automation Conference & Exhibit, June 6-8, Royal York Hotel and Queen Elizabeth Hall, Toronto, Ont.

Drop Forging Association — Annual Meeting, June 14-17, The Greenbrier, White Sulphur Springs, W Va.

National Association of Metal Finishers—Annual Convention, June 16-19, Statler Hilton Hotel, Boston, Mass.

American Society for Testing Materials — Annual Meeting, June 25-30, Chalfonte-Haddon Hall, Atlantic City, NJ.

Joint Automatic-Control Conference, June 28-30, University of Colorado, Boulder, Colo.

Society of Automotive Engineers —Farm, Construction, and Industrial Machinery Meeting, Sept 11-15, Milwaukee Auditorium, Milwaukee, Wis.

Instrument Society of America—Annual Meeting and Automation Exhibit, Sept 11-15, Memorial Sports Arena, Los Angeles.

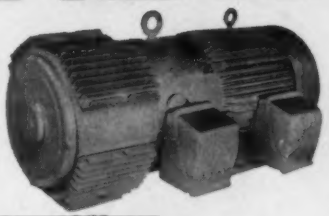
Pressed Metal Institute—Annual Meeting, Sept 24-28, Grand Hotel, Point Clear, Ala.

American Welding Society—National Fall Meeting, Sept 25-28, Adolphus Hotel, Dallas.

American Die Casting Institute—Annual Meeting, Sept 27-28, Edgewater Beach Hotel, Chicago, Ill.

American Machine Tool Distributors Association — Annual Meeting, Oct 4-6, Penn Sheraton Hotel, Pittsburgh, Pa.

NEW



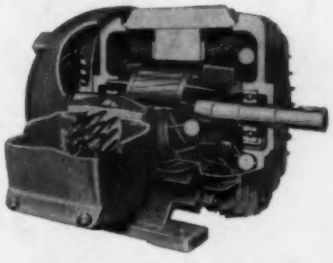
Rectiflow adjustable speed drives

Economical, simple, reliable, over 3:1 speed range or higher, inherent constant hp characteristics. 20 hp to 600 hp in open and totally enclosed air-cooled designs. Inherent fast response and close speed regulators make this drive a natural for a wide variety of machine tool applications. For more information, write Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pa. *You can be sure . . . if it's Westinghouse.*

J-96169

Westinghouse

NEW



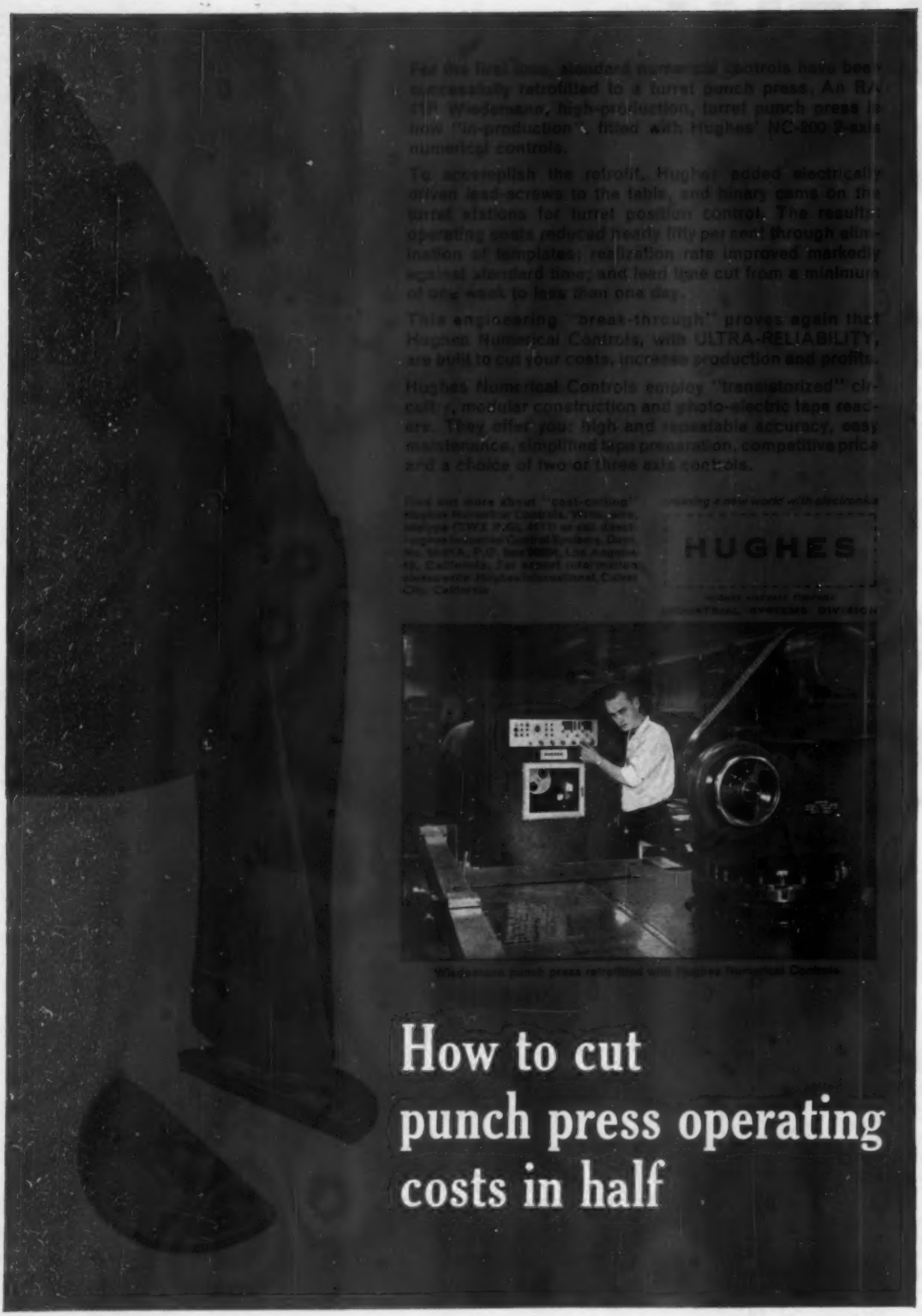
Guardistor motors

Guaranteed against burnout due to overheating from any cause! Exclusive static-semiconductors imbedded in windings respond with snap action *only* when windings reach critical temperature. Anticipated nuisance trips are avoided. Use full rated hp safely. Available for any size motor. Write for Bulletin B-7876 to Westinghouse Electric Corp., Box 868, Pittsburgh 30, Pa. *You can be sure . . . if it's Westinghouse.*

J-96171

CIRCLE 281 READER SERVICE CARD

CIRCLE 282 READER SERVICE CARD



How to cut punch press operating costs in half

SPOT NEWS...

- **De Beers Consolidated Mines Ltd will make synthetic industrial diamonds** on a commercial basis in South Africa through a newly formed subsidiary, Ultra High Pressure Units Ltd. Move is chiefly insurance against possible interruption of natural bort supplies from the Congo. Production is scheduled to start later this year.

- **Possible tipoff to the Kennedy administration's policy on imports** may have been evident in the President's recent decision against imposing country-by-country import controls on textiles. New decision affects only textiles, but the policy conceivably could be applied to other light-manufacturing items.

- **Reactive metals in strip form can be continuously annealed** in a furnace which uses electron-beam heating. Coils of strip unwind and rewind in air at each end of the furnace while the strip passes through a high-vacuum chamber containing the electron-beam heating unit. Furnace was developed by Temescal Metallurgical Corp (Berkeley, Calif). Immediate application is seen in processing tantalum, columbium, titanium for atomic-energy and space use.

- **Volkswagen's 1960 sales of about $1.2 billion put it in first place** in sales volume for German firms, topping Krupp and Siemens, who have traditionally exchanged the lead since the end of World War II. Krupp closed out the year slightly over $1 billion, Siemens at about $880 million.

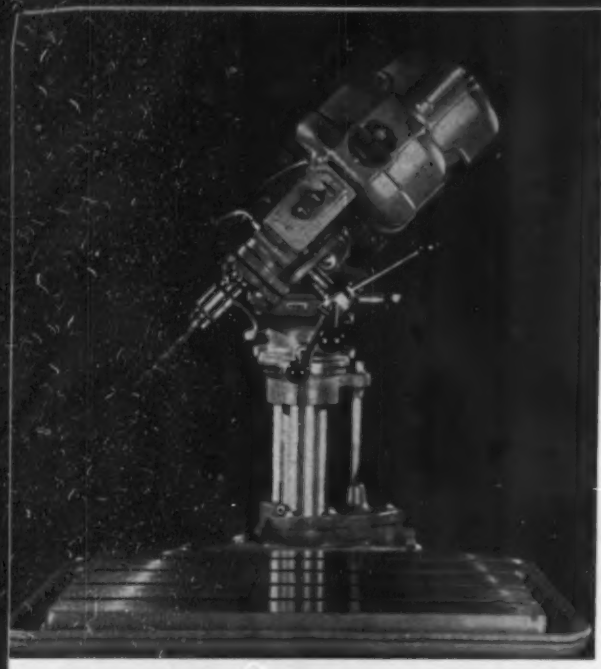
- **Pneumatic-hydraulic numerical control system** developed by Moog Servocontrols is being applied to Bridgeport milling machines and Burgmaster turret drills. Eighteen units are reported to have been built since prototype was shown in Chicago last September. Air blown through holes in tape operates hydraulic valves to control two-axis positioning system.

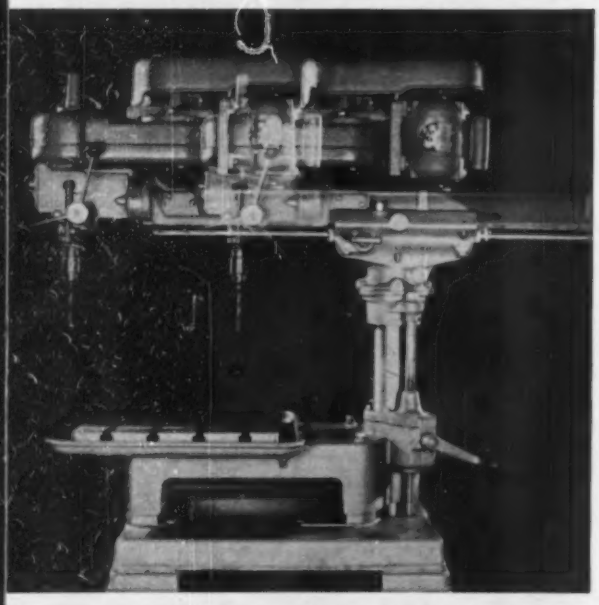
- **Jurisdictional rhubarb between AFL-CIO craft and industrial unions** over construction jobs in industrial plants has heated up anew. U S Appeals Court recently ruled against the Steelworkers union in a test case involving Tennessee Coal & Iron Works. Steelworkers, fighting for jobs, prevented craft unions employed by an outside contractor from working at the plant site. Court ruled this an illegal secondary boycott. Case now goes to Supreme Court.

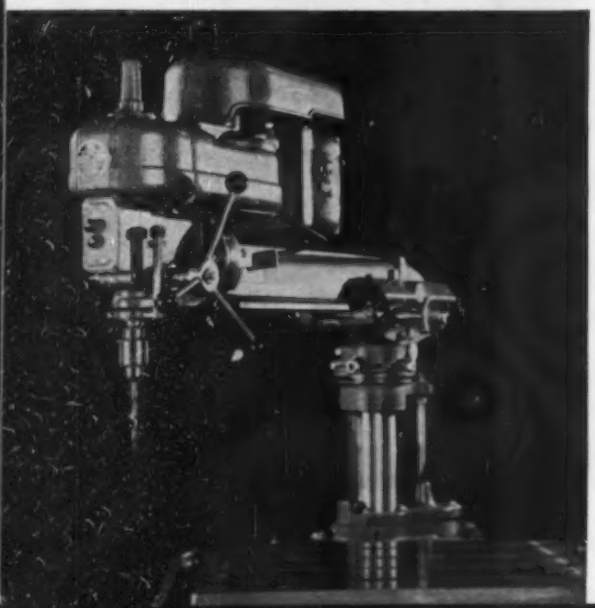
- **New consulting service for users of vertical-spindle surface grinders** is offered by American Emery Wheel Works (1 Richmond Sq, Providence 1, RI). Given a rundown of the job, the equipment available, finishes and tolerances desired, and stock to be ground, American will conduct the necessary research and recommend the type of wheel that should be used, will recommend procedures, and provide an estimate of production costs.

- **Trend to L-P gas for powering fork trucks was much in evidence** at the recent regional (Eastern States) show held in Philadelphia by the Materials Handling Institute. Several truck builders had new or redesigned LPG-powered models on display. One builder reported that these trucks, which accounted for about one in ten sales a couple of years ago, are now specified by two out of every five customers.

- **Elimination of job discrimination on government contract work** is being tested at Lockheed (Marietta, Ga). Officials of the President's Committee on Equal Employment Opportunity have been talking privately with Lockheed officials to end racially segregated facilities and to open up apprenticeship and opportunities for Negroes. The technique, which is expected to succeed, is quiet persuasion with contractors, backed by a threat of contract cancellation.







Any way you look at it

YOU CAN'T BUY MORE *FLEXIBILITY*

At a low price of $760.00* Walker-Turner "Light-Heavyweight" Radial Drill Presses do the work of machines costing more than twice as much! For fast set-up in drilling of large or heavy stock and to solve special horizontal or vertical drilling problems they offer these important extras: *Extra wide drilling range*—head moves 18" on traveling ram, swivels 360° around column, tilts 45° left or right. *Extra speed versatility*—choice of 15 speeds from as low as 110 rpm to as high as 8300 rpm. *Extra capacity*—drills to center of 62" circle, your choice of 4¼" or 6" spindle travel. But the biggest extra is the extra savings you'll enjoy on fixturing and set-up time when you put this rugged machine to work on your toughest drilling jobs.

Visit your Walker-Turner Distributor (listed in the Yellow Pages under MACHINE TOOLS or TOOLS). Learn for yourself why more people in metalworking call Walker-Turner the *value* line.

**Model 1612-12*

Get information on all 24 models of the W-T Radial Drill Press. Write for FREE Catalog: Rockwell Manufacturing Company, Walker-Turner Division, Dept. WE21, 400 North Lexington Ave., Pittsburgh 8, Pa.

WALKER-TURNER
"LIGHT-HEAVYWEIGHT" MACHINE TOOLS
another fine product by
ROCKWELL

CIRCLE 284 READER SERVICE CARD

WASHINGTON...

Tax credit plan criticized . . .

In a week of steady hearings, the President's tax credit plan for stimulating capital investment was given a cool-and-critical going-over by members of the House Ways & Means Committee and by most of the businessmen and tax experts who testified on it.

There's unanimous approval of the plan's purpose, but the plan itself is finding little outside support. Industry witnesses and non-government tax experts propose instead some kind of depreciation reform, which, they said, is long overdue.

More than 60 witnesses either appeared or submitted statements to the Ways & Means Committee. They included the Machinery and Allied Products Institute (MAPI), the Chamber of Commerce, Universal Cyclops Steel Co, Latrobe Steel, Carpenter Steel, Crucible Steel, and representatives from the copper and brass, chemical, telephone and telegraph, and machinery industries.

George Terborgh, representing MAPI, presented the Institute's official position. Essentially it was this: The tax credit plan "is as complicated as it is novel." It opens the door to future litigation, and can't be shown to be superior in "incentive value to any of the simpler alternatives available."

MAPI recommended that "if the tax credit approach . . . is to be followed" it should be flat-rate, across-the-board credit instead of the Treasury's proposed bracket system (*AM/MM* —May 1 '61, p55). And it recommended that the rate be fixed at 10%, at least.

Should Congress reject the tax credit plan, MAPI recommended a 30% initial writeoff on all new investment. But Terborgh noted that if it is possible to get adequate depreciation reform quickly, this should get priority.

Joel Barlow, tax lawyer of Covington & Burling, representing the U S Chamber of Commerce, said the tax credit "really amounts to a direct subsidy to one segment of business . . ." His recommendation: Lift the $10,000 ceiling on the present 20% initial allowance already in the tax code.

Barlow argued against revival of the wartime 5-year writeoffs, saying that what's needed is "not some periodic shots in the arm of accelerated amortization, but full recognition of the new technological obsolescence" through "a complete upward revision of depreciation allowances."

Outlook for the tax package . . .

There has to be a tax bill passed by Congress this year, if only to approve a continuation of the 52% corporate tax rate and the excises that would otherwise either expire or decline. But the outlook for the rest of the tax package is uncertain.

Another defense hike?

The administration is making a new assessment of the nation's economy to determine the need for additional Washington measures to drive for a speedier economic recovery. Right now, the possibility of still another boost in military and space spending shapes up as a strong possibility.

Administration officials dislike tainting defense spending with an anti-recession label, mixing military budgets with economic politics. But the Pentagon and NASA are clamoring for more money—above and beyond the sums already added to Eisenhower's budget by Kennedy—and there's the fact that increased space and military projects would get a warmer reception in Congress than would a stepped-up public-works program.

Boost in conventional arms . . .

The outlook is for an increase in procurement of conventional arms and equipment to fight non-nuclear wars rather than another expansion in strategic weapons production.

The Army and Marine Corps, pushing for more money, say that their requirements were not given adequate attention during the administration's hasty defense policy review earlier this spring.

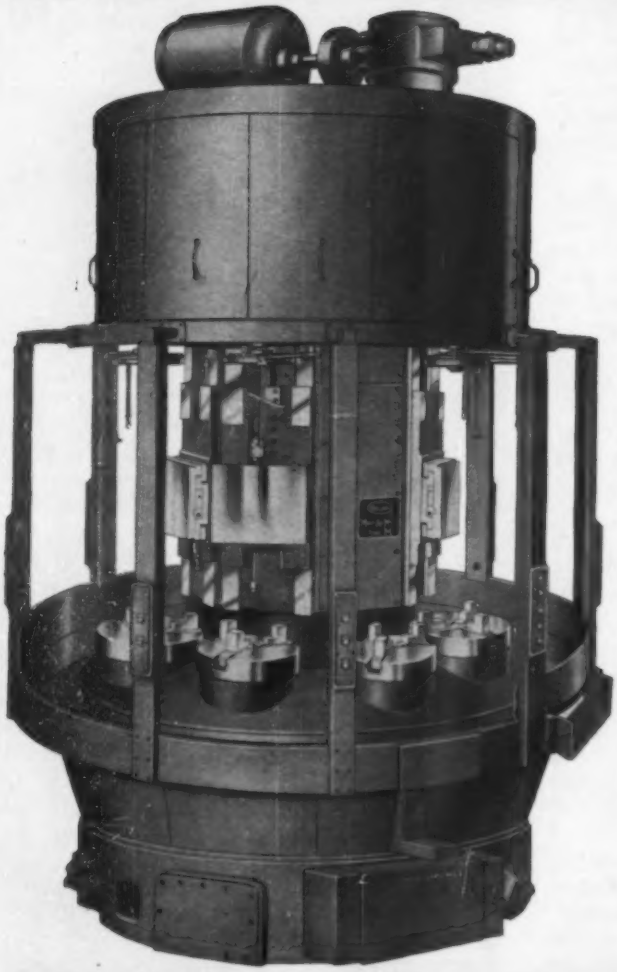
Pentagon insiders say that "there might be" a supplemental appropriation request for Fiscal 1962 sent to Congress this summer.

Accelerated military contracting . . .

The Defense Department reports that military procurement officers have already exceeded the administration's anti-recession goal of accelerating the rate of military contracting.

Latest figures show that $701 million in contracts were placed ahead of schedule in the period from February 20 to April 7. Officials expect to accelerate the award of an additional $159 million in new orders by June 30. During the April-June quarter of this year about $8.5 billion in contracts will be placed. This is about $3.5 billion over the previous quarter.

NOW BULLARD PRICED LOWER!



NEW Bullard Mult-Au-Matic Type "M"

Contrary to the general upward trend in the cost of new plant production equipment, The Bullard Company is offering the *new* Type "M" Mult-Au-Matic at a price which is *lower than competitive methods.*

Designed and built according to exacting Bullard standards, the *new* Type "M" Mult-Au-Matic incorporates many new features of rigidity, accuracy and productivity which have made this machine famous the world over.

For complete information on the *new* Bullard Type "M" Mult-Au-Matic, call your nearest Bullard Sales Office or Distributor or write to

The Bullard Company, Bridgeport 9, Conn.

DETROIT...

Sales booming . . .

There is no doubt of it. The annual spring surge in auto sales has once again appeared.

According to statistical data compiled by *Ward's Automotive Reports*, the selling pace during the first 10 days of May clipped along at the rate of 18,348 domestic units daily. It is a figure high enough to prompt Chevrolet's Edward N Cole to raise his sights to a 6-million-unit calendar year.

Add in the imports whose sales are running at the rate of about 1200 units a day, multiply by the 307 selling days available, and the figures tally, with but one exception. The exception is that the pace is still not fast enough to make up for the poor first quarter.

To achieve Mr Cole's prediction a banner fourth quarter is obviously necessary. Henry Ford II, whose own prediction is 5.8 million cars, says: "The months of December, January, and February were disastrous. Now the market is looking up, but it is nothing fantastic."

Dealer stocks . . .

Another bright indicator is that dealer stocks have fallen to a manageable 900,000-unit level. This is about 49-days supply at the present selling rate, and it is probable that the figure reflects the vast variety of models now on the market rather than too fat an inventory.

A dealer today, to stock his factory's full line, must have many more cars on the floor than ever before. For example, a Ford dealer in addition to three lines of standard-size cars and the Thunderbird must stock five basically different Falcons. And even this substantial inventory investment does not reflect the necessary variety of color and accessory combinations that must be kept on hand. Nor does it include those fast-selling compact trucks introduced last fall.

The trend to personalization in automobiles, while fine for the consumer, is a major headache for the dealer and may eventually lead to the much talked about automotive supermarket.

Next year the problem will be compounded, for each of the big three will introduce new lines of 115-inch wheelbase cars and add convertibles to the roster of compact-body models offered.
Yet it is this variety that prompts Chevrolet's Cole to look forward to a 7-million-car year in 1962. This is not just a talking point; Chevrolet buying for the new models is firmly planned at that rate.

A further barometer . . .

Used car sales have always been linked to new car demand by a rule of thumb. The idea is that when a dealer's used-car lot thins out, he tends to offer more on a trade-in and thus make the deal more attractive. The customer has to shell out less, if any, cash and his monthly payments are reduced. But when the lot is jammed the appraisor tries to "steal" trade-ins. The customer balks and the sale is lost.

One sometimes is inclined to question the validity of such long-held industry ideas. Perhaps a more pertinent reason for the connection between new and used-car sales is that the confidence shown by the low-income person who buys the used car gradually exudes upwards to the higher income brackets where new-car sales are most often made.

In any case, Ford President John Dykstra reported to a recent meeting of stockholders that used-car stocks across the nation on April 30 totalled 739,000 units—126,000 units lower than a year ago at this time. He further reported that dealers are now actively soliciting used-car suppliers for the first time in many months.

Reflection in production . . .

The increase in sales was slow to reflect in production because of the high dealer inventories of the first quarter. The first quarter itself rounded out at about 1,200,000 units, and 1,500,000 are projected for the current period.

Shutdowns for changeover are scheduled for mid-July. In general, the industry has pushed introduction dates for the 1962 models ahead by an average of two weeks, in an obvious move to guard against the possibility, however remote, that it may face a strike.

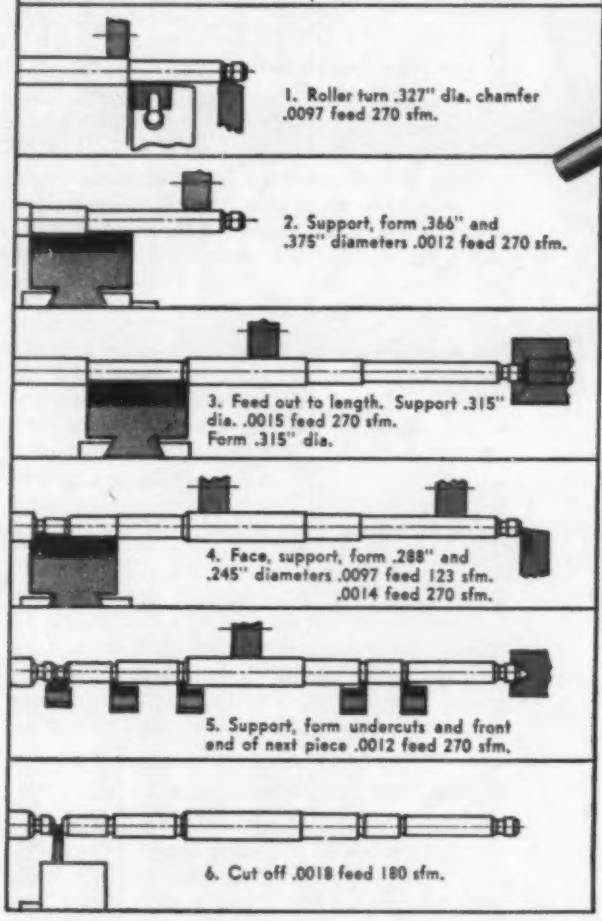
For this reason, when production resumes in mid-August it will move at a fast pace. Early, heavy buying in steel and other basic commodities indicate that initial production at least will be pegged at a 650,000-unit monthly rate.

Chrysler will once again lead the changeover with an early August start on 1962 models. By the first week of September its dealers will be fully stocked and public announcement will come during the second week.—**Don MacDonald**

GREENLEE AIR-FEED AUTOMATICS BENEFIT "ELECTROLUX" FOUR WAYS . . .

MACHINE . . . 1"-6 Automatic Bar Machine Air-Feed — Feedout on index and in 3rd position during machine cycle.
TOOLING . . . Carbide Tipped
MATERIAL . . . 1137
STOCK SIZE . . . 13/32" rd.

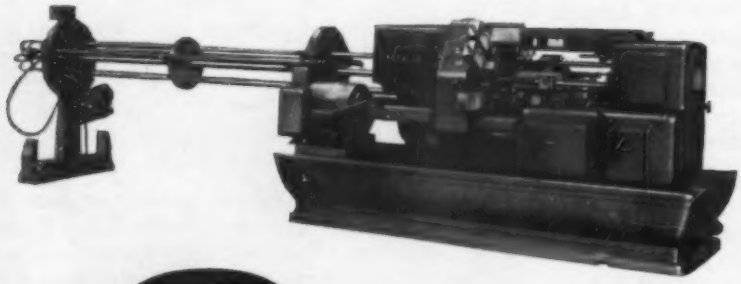
TOOL SLIDE STROKE . . 1-9/16" at .0097" feed.
SPINDLE SPEED . . . 2540 rpm 270 sfm.
MACHINE TIME . . . 5.8 seconds.
ESTIMATED GROSS PRODUCTION . . . 620 per hour


1. Roller turn .327" dia. chamfer .0097 feed 270 sfm.
2. Support, form .366" and .375" diameters .0012 feed 270 sfm.
3. Feed out to length. Support .315" dia. .0015 feed 270 sfm. Form .315" dia.
4. Face, support, form .288" and .245" diameters .0097 feed 123 sfm. .0014 feed 270 sfm.
5. Support, form undercuts and front end of next piece .0012 feed 270 sfm.
6. Cut off .0018 feed 180 sfm.

1. Eliminate stock pushers . . .
2. Eliminate scoring of stock . . .
3. Reduce downtime during set-up . . .
4. Provide extra length feed-out . . .

The part is a 6-7/8" long armature shaft used in the "Electrolux" vacuum cleaner. It demonstrates how effectively Greenlee Air-Feed Automatics and carbide tooling can team-up to increase production and reduce costs. The shaft is machined from 13/32" S.A.E. 1137 steel at a gross production rate of 620 pieces per hour. Recommended cutting speed for high speed tooling is 120 sfm. The rate was boosted to 270 sfm with carbide-tipped tooling. Sequence of operations is shown at the left.

Note how the stock is partially fed out on the index and to its full length in the third position. This provides for the most effective tooling arrangement. Greenlee Air-Feed Automatics permit greater job versatility and assure added profits. See your Greenlee representative or send us a print of your high-cost problem-part.



Write for your copy of Catalog A-405

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GREENLEE BROS. & CO.
SINCE 1862
1975 MASON AVENUE
ROCKFORD, ILLINOIS

COMMERCIAL CASTINGS
TRANSFER MACHINES • SPECIAL MACHINES • AUTOMATIC BAR MACHINES • WOODWORKING MACHINES AND TOOLS • DIE CASTING MACHINES • TRIM PRESSES • HYDRAULIC AND HAND TOOLS

AIRCRAFT and MISSILES... TRENDS

Congress adds bomber funds . . .

Congress wants the Air Force to continue building Boeing B-52 long-range jet bombers. Present schedules call for phasing out production in 1962. Neither the Eisenhower nor Kennedy defense budget earmarks new funds for additional procurement, but in voting a $12.5-billion authorization bill for procurement of aircraft, missiles, and naval vessels, the Senate tacked on authority to buy $525-million worth of strategic bombers—or another wing of 45 aircraft. The House Armed Services Committee okayed an additional $337 million for bombers.

There's no hint as to whether the Defense Department would use the additional bomber funds, assuming an appropriation bill is voted to back-up the authorization. (This is the first year that military procurement is going through two Congressional cycles—first, authorization legislation, then the regular appropriation bill.)

The lawmakers feel that the Defense Department is making the strategic transition from bombers to missiles much too fast. Actually, there are many Air Force leaders who plug for continued B-52 production. They're disappointed in the Kennedy administration's cutback in B-70 bomber development (and in Congressional failure to reverse the cutback decision), and argue that the manned bomber must always play a major role in strategic warfare because of its performance flexibilities.

Budget details withheld . . .

Both Congress and Defense Secretary McNamara are clamping down on disclosure of the kind of budget detail that has been routine in the past—numbers and types of weapon systems and the amount of money allotted to each one.

Senator Richard Russell (D, Ga), chairman of the Senate Armed Services Committee, applauds McNamara's new intent to hold back a considerable amount of budget detail on security grounds. Some lawmakers also feel that disclosure of the sums allocated to specific projects in the defense authorization and appropriation bills puts the Pentagon at a disadvantage in negotiating contracts with arms producers.

Space program to be expanded . . .

President Kennedy is about to order another step-up in the space program. Reports are that he will ask for a $600-million increase, the bulk of it for NASA and $100 million for the Pentagon.

Most of the new funds would go to expand project Apollo, a three-man vehicle designed for flights to the moon and back. Other programs that will get a boost include the development of solid-fueled and nuclear-powered rockets and space communications gear.

Space spending is now estimated at about $2.4 billion for the year starting July 1, and this is split about evenly between the military and civilian agencies.

Next propaganda milestones in space exploration will be the orbiting of a multi-manned vehicle and sending a man to the moon and back. Buoyed by Astronaut Alan B Shepard's recent sub-orbital flight, the guessing in Washington is that the U S will go all-out in trying to beat the Soviets to a manned flight to the moon.

Convair Division realigned . . .

General Dynamics has created five new operating divisions and two major organizational groups. The new divisions, all formerly components of Convair Division, are: GD/Astronautics, GD/Fort Worth, GD/Pomona, GD/San Diego, and GD/Daingerfield. The former Convair general office at San Diego will be eliminated, but "Convair" will be retained as a tradename.

Moving operational headquarters of General Dynamics to San Diego "will place direct corporate supervision at the center of some 75% of our total business," said Earl D Johnson, president of GD.

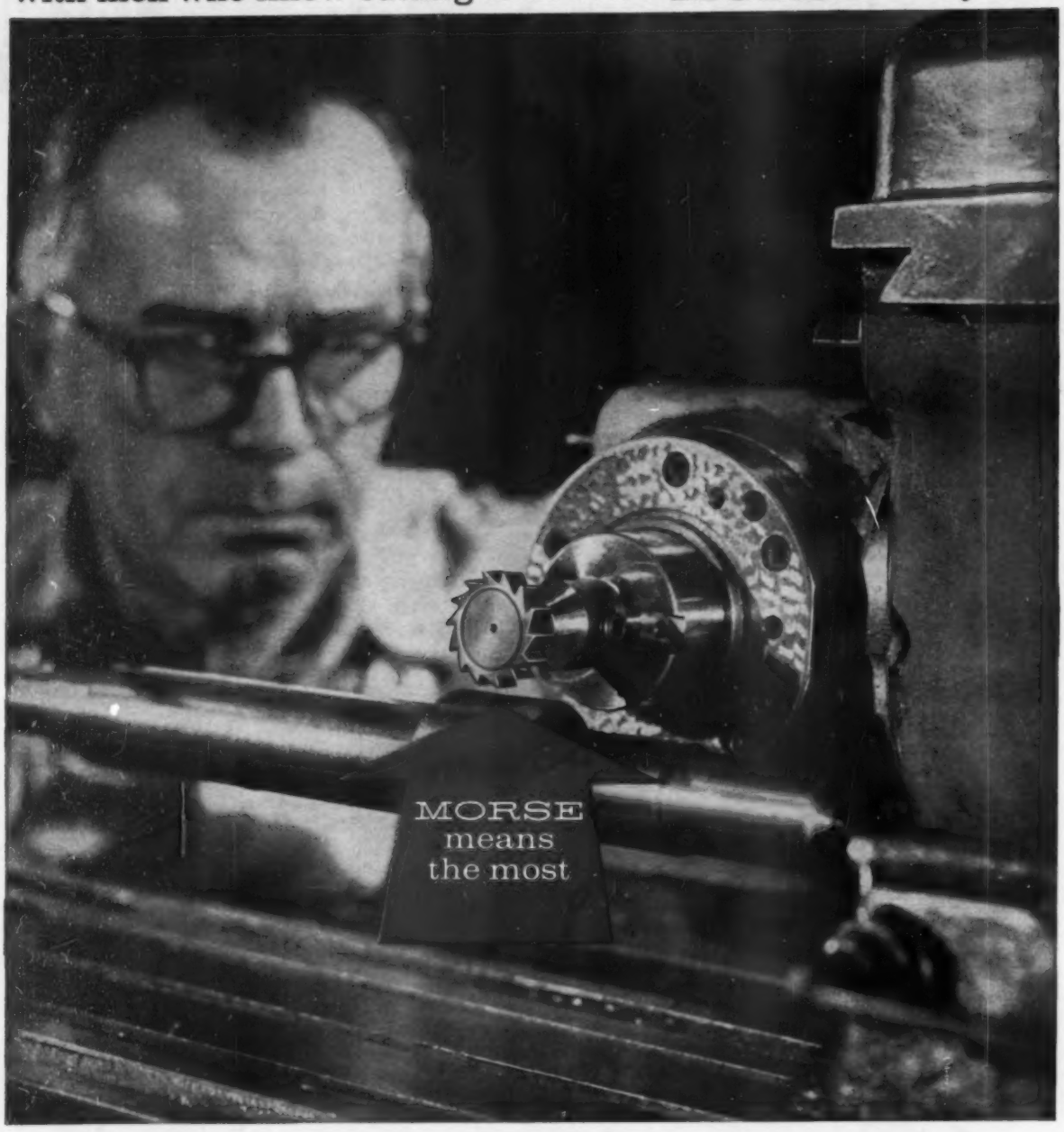
The five new divisions, plus General Atomic Division, will now report to C Rhoades MacBride, executive vice president, in San Diego. The other seven divisions of the corporation will report to W P Gullander, executive vice president, in New York.

MacBride said the primary reason for the change was to meet space age challenges and problems. He admitted that there are inconsistencies in the new setup, such as having a large San Diego electronics force report to GD/Electronics in Rochester, NY. He pointed out that GD divisions would "compete like hell" under the new plan, but would benefit from cross-fertilization.

"The sheer detail work [of changeover] will take a lot of time and thought," said MacBride. For example, all the contracts will have to be rewritten, resulting in thousands of changes with military customers.

General Dynamics appears to be ready to go into rocket propulsion, particularly in nuclear power, where it now holds a lead in General Atomic's project Orion.

with men who know cutting tools... it's MORSE everytime



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WAREHOUSES IN: NEW YORK • CHICAGO • DETROIT • DALLAS • SAN FRANCISCO

MACHINE TOOLS...

Buick has crash program...

Buick has a crash tooling program for a cast-iron V-6 engine line for 1962 models to be introduced later this year.

Some machine tool builders have already started the work of adapting for this line the machines delivered to Buick originally for V-8 production. A new crankshaft, new heads and some new machining on the block are involved. But there is not much change in engine accessories.

Buick is understood to have planned to buy certain new machines for the V-6 line, but because of the tight timing demanded three-months' delivery. This schedule virtually ruled out the building of new machines.

The Buick program created considerable excitement in machine tool circles, with interested builders traipsing to Flint in a rush the past two weeks.

To make South Bend lathes in India

South Bend Lathe Inc has completed arrangements to manufacture its precision lathes in India. For this purpose South Bend Lathe (India) Ltd has been organized. It is to be located in Coimbatore, Madras State. It will continue the long-standing policy of South Bend of producing quality precision machine tools selling at a reasonable price. The price is made possible, South Bend declares, by using batch production methods.

Because of the adaptability of its lathes to all types of industry, South Bend feels that there is a good market for its machines in India and South East Asia. South Bend is a subsidiary of American Steel Foundries.

CVA to make Flying Scot...

The G A Gray Co, Cincinnati, has granted a license to Kearney & Trecker-C V A Ltd to make its machines at its Hove, England, plant and sell them exclusively throughout the British Commonwealth, with the exception of Canada. The first Gray model to be put into production is the Flying Scot planer.

A subcontracting arrangement is part of the contract between the two firms, whereby Kearney & Trecker-C V A Ltd would build Gray products for customers outside the Commonwealth.

Kearney & Trecker-C V A Ltd also has been licensed by Houdaille to make the Wales-Strippit line of self-contained punching and notching units used in the sheet metal industry (but not Wales-Strippit punching machines).

Romi buys US machines...

Eastern Machinery Co, Cincinnati, has shipped about $700,000 of used machine tools to the lathe-building plant of Maquinas Agricolas Romi S A, Santa Barbara, Brazil, near Sao Paulo. At the same time Eastern has become a minority stockholder in Romi.

Romi has got wide publicity for its mass-production methods of manufacturing engine lathes. Its plant has a high percentage of U S machine tools. Its lathes are principally sold in Brazil and nearby Latin-American countries.

Competition from British...

A A Jones & Shipman Ltd is reported setting up selling headquarters for the United States in Guilford, Conn. This national office will be responsible for appointing distributors to sell the firm's grinders and for supervising sales.

Wickman Ltd has established a national sales office in the Sibley Tower Building, Rochester, N Y. It has been active for some time in competing for U S business on automatics.

Sykes Machine Tool Co Ltd, which has had a sales office in New Jersey, has moved its U S selling headquarters to Detroit. It is the sales agency for the gear machines built by W E Sykes Ltd.

What with the sales activities of these companies, plus other British builders seeking orders here, the British plan on giving some keen competition to U S machine tool builders here at home.

European show in September...

About 4000 machine tools will be on display at the 7th European Machine Tool Exhibition in the Palais du Centenaire at Brussels, Belgium, September 3-12.

Exhibitors will include 280 West German builders, 145 French, 87 Italian, 65 British, 38 Belgian, 91 Swiss, 21 Dutch, 17 Swedish, 13 Austrian and 5 Danish. Room reservations are being handled by Thos Cook & Son Ltd.

The show catalog will be available from July on at a cost of 150 Belgian francs for air dispatch outside Europe. Orders can be sent to: No. A 26/161 of Commissariat General of the 7th European Machine Tool Exposition 13 rue des Drapiers, Brussels 5. Catalog will contain alphabetical list of exhibitors as well as exhibitors by nationality, halls and types of machines.

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MATERIALS...

Zerolled stainless . . .

Rolling and forming austenitic stainless steels at sub-zero temperatures—the optimum seems to be about – 105 F—substantially improves both tensile strength and ductility. Stainless alloys that crack during cold working at room temperature can be formed and strengthened by working them at – 105 F or colder temperatures.

Aircraft companies or furniture manufacturers, for example, that are roll forming, taper milling, or chemically milling austenitic stainless might benefit by using sub-zero treatment. At present, applications of the process are limited because the resulting material is not acceptable under the Boiler Code, where it applies to tanks and vessels. (The Boiler Code recognizes only annealed properties.) However, in some products, sub-zero treatment may improve the workability of the metal enough to warrant the expense, without using strength advantage.

According to the Stainless Steel Institute, small quantities of zerolled sheet are available from Universal-Cyclops Co, Bridgeville, Pa. Greatest immediate potential for stainless steel treated in this way is in cryogenic equipment for missiles and astrocraft. At – 423 F, the lowest temperature studied, type 304 stainless steel had better impact strength than at room temperature. Explosive expansion is much more readily accomplished at sub-zero than at room temperatures.

Tensile strength of annealed 18-8 stainless steel at – 320 F is about three times the strength at room temperature. A modified type 347 alloy, containing 9.5% nickel, rolled to a 40% reduction at – 105 F showed a tensile strength of 190,000 psi. Heat treating this material, after zerolling, at 800 F for 100 hr increases the tensile strength to 300,000 psi. For cooling to – 105 F, a bath of dry ice and methyl alcohol was used.

International Nickel Company holds a Canadian patent on the zerolling process, while N A Ziegler and P H Brace hold a U S patent on the process. The latter patent also covers heat treatment at 800 F subsequent to zerolling.

30-million-to-one motor . . .

Smooth performance at speeds as low as 1/60,000 rpm (one revolution every 41-2/3 days) is claimed for a 22-cu-in. hydraulic motor offered by the Cimtrol Division of Cincinnati Milling Machine Co. Installed on a Heald Model S Borematic, the same motor also operates smoothly at 500 revolutions per minute in rapid traverse.

An unusually high rate of response is another feature of this motor. At 100 rpm, for instance, the motor will rotate only 0.0006 of one revolution after the servo valve transmits the signal to stop. Thus, virtually instantaneous reversal of rotation is possible. If the motor is turning clockwise at 100 rpm, only 0.0015 of a second is required to reverse to 100 rpm in a counterclockwise direction.

Output of the motor is very "stiff;" there is no backlash or stick-slip. Because of its high torque-to-inertia ratio the motor may be directly connected to a leadscrew or other drive component without intermediate gearing.

Available with a stub shaft or with a bearing-mounted hollow shaft, this motor has many possible applications. Its compact design (12½ in. dia x 5¼ in. thick) suits it for use as a rugged prime mover on machine tools and on other mechanical and electronic devices. High response rate plus smooth operation at ultra-low speeds make the hydraulic motor practical for driving precise devices such as radar antennas for missile tracking.

Two-speed induction motor . . .

A new principle permits speed changing in any ratio from a single-winding induction motor, at only slightly extra cost. "Pole-amplitude modulation" is the name given to the new speed-changing method.

In a conventional three-phase induction motor the magnetic waveform for each phase has an approximately sinusoidal distribution around the stator assembly. If the amplitude of this waveform is modulated in space by suitable coil reconnections the resultant waveform around the stator will have a different spatial distribution. For example, the resultant waveform of one phase-winding of a pole-amplitude modulated machine will be found to contain magnetic waveforms corresponding to 6 and 10-pole motors, mixed.

Professor G H Rawcliffe, inventor of this method and head of the electrical engineering department in the University of Bristol, England, discovered how to selectively eliminate one pole number from the resultant three-phase field. Thus a pure three-phase field corresponding to a single speed is obtained. Details can be obtained from National Research Development Corp, Suite 503, Mercury Bldg, 1925 K Street NW, Washington 6, DC.

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WHAT'S AHEAD... in Metalworking

TRENDS

Metalworking production continues to rise . . .

Metalworking production continues to rise, and the pickup far exceeds anything that can be attributed to seasonal influences. The AM/MM Index of Metalworking Production, reflecting this gain, is estimated at 101 for May—up one point from April. (The estimated figure for April was 97, but the pickup was such that the April preliminary index now has been set at 100.)

Steel production is rising right in step with increasing demand. Tinplate and galvanized sheet are in strong demand, and steel ordering by the auto industry has picked up considerably in the past few weeks.

The auto industry's increasing steel purchases may indicate an attempt to stockpile additional autos in case of possible shutdowns caused by labor problems later in the year.

Automotive parts producers report increased production. Although monthly volume still trails that of a year ago, producers state that recent activity is encouraging and that production schedules are firming all the time.

Screw-machine-products producers indicate a change for the better in recent weeks, with some pickup in the rate of orders. There is no doubt, however, they are still running behind 1960 levels.

The Pressed Metal Institute reports business in the latest month was up 9%. Though business is still below last year's levels, the upturn is very encouraging to the stamping industry. The outlook now is for 1961 to equal or better 1960 results.

Metalworking job shops are optimistic about the future. The effect of hard goods recovery is apparent and the spring pickup in construction is having its effects.

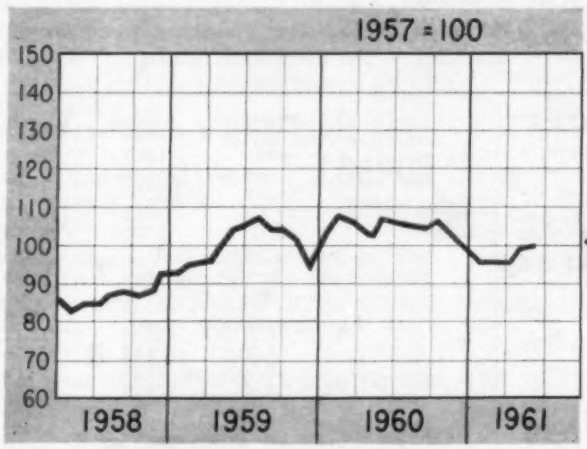
The pickup in the appliance industry appears to have staying power. Manufacturers are predicting a rise of anywhere from 2% to 10% through June. The outlook is good, especially since the retail price picture appears stable.

Cutting tool manufacturers exhibit a brighter outlook now that new orders and backlogs are good. Several companies say that the second half may turn out better than the first half of the year, and that, they add, is unusual in the cutting tool industry.

The plastic molding business, which has never really been too bad, continues to pickup. As one molder put it, "We're never too badly off because new uses and applications are being found every day for plastics."

Steel foundries report slow upward movement in their activity. The increases are coming from all segments of industry, but the orders are for just what is needed for immediate production. Nothing is being purchased at this time to build inventories.

Gray-iron foundries are operating at about 60% of "ideal" capacity. Ideal capacity is that level of activity in shops that would be considered normal: normal shifts, no overtime, no layoffs. Nonferrous founders report little change in the level of orders since the beginning of the year. The outlook here is not too bright.



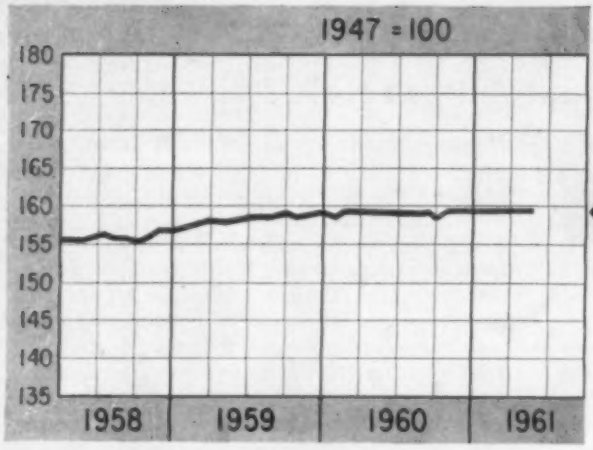
AMERICAN MACHINIST INDEX OF METALWORKING PRODUCTION

BASED ON MANHOURS WORKED IN THE FIVE COMPONENTS

	MAY Estimated	APR Preliminary	MAR Revised	MAY Year Ago
Total Index	**101**	**100**	**96**	**108**
Machinery	99	95	102	
Electrical Machinery	111	109	114	
Autos	100	86	115	
Other Transportation .	88	88	89	
Other Metalworking ...	101	100	106	

TRENDS

WHAT'S AHEAD... in Business



AMERICAN MACHINIST INDEX OF METALWORKING PRICES

	MAY Estimated	APR Preliminary	MAR Revised	MAY Year Ago
Total Index	**159.3**	**159.4**	**159.5**	**159.6**
Metalworking Machinery	**193.9**	**195.1**		**190.4**
Other Machinery exc. Electrical	**173.9**	**173.8**		**173.0**
Electrical Machinery	**157.8**	**158.3**		**162.2**
Fabricated Metal Products	**147.0**	**147.0**		**147.9**

Consumers and the outlook . . .

Amid generally heartening reports on the business outlook, news of a dip in retail sales during April sounded a discordant note. Instead of an expected rise in consumer buying, a 1% decline in retail sales was recorded for the month. But you shouldn't let this development dim your view of a steadily improving general business outlook for the months ahead. There is sufficient evidence to indicate that the current business rebound rests on a solid foundation. And rising consumer buying is likely to be one of the elements in the business upswing in the approaching months.

Offsetting any gloom that may have been generated when consumers shaved their outlays for goods was the report that industrial output had increased substantially during April. The 2.5 point increase in the Federal Reserve Board's index of industrial production recorded for April was the first significant rise in the measure in many months, and it sent the index to 105 (1957=100) on a seasonally adjusted basis. In so doing it clearly indicated that the sector of the economy hardest hit by the recession—manufacturing—is now on the upswing.

A substantial part of the rise in industrial output was the result of stepped-up production of consumer goods. Consequently, a rise in consumer buying figures importantly in prospects for further gains in industrial output. This increase in consumer spending for goods appears assured for the months ahead.

Consumer incomes have been rising in response to federal anti-recession measures. In manufacturing, increased defense ordering has added to the work week in recent months. Stepped-up highway construction and, more recently, legislation increasing minimum wages for numerous workers also are acting to put more income into consumers' pockets.

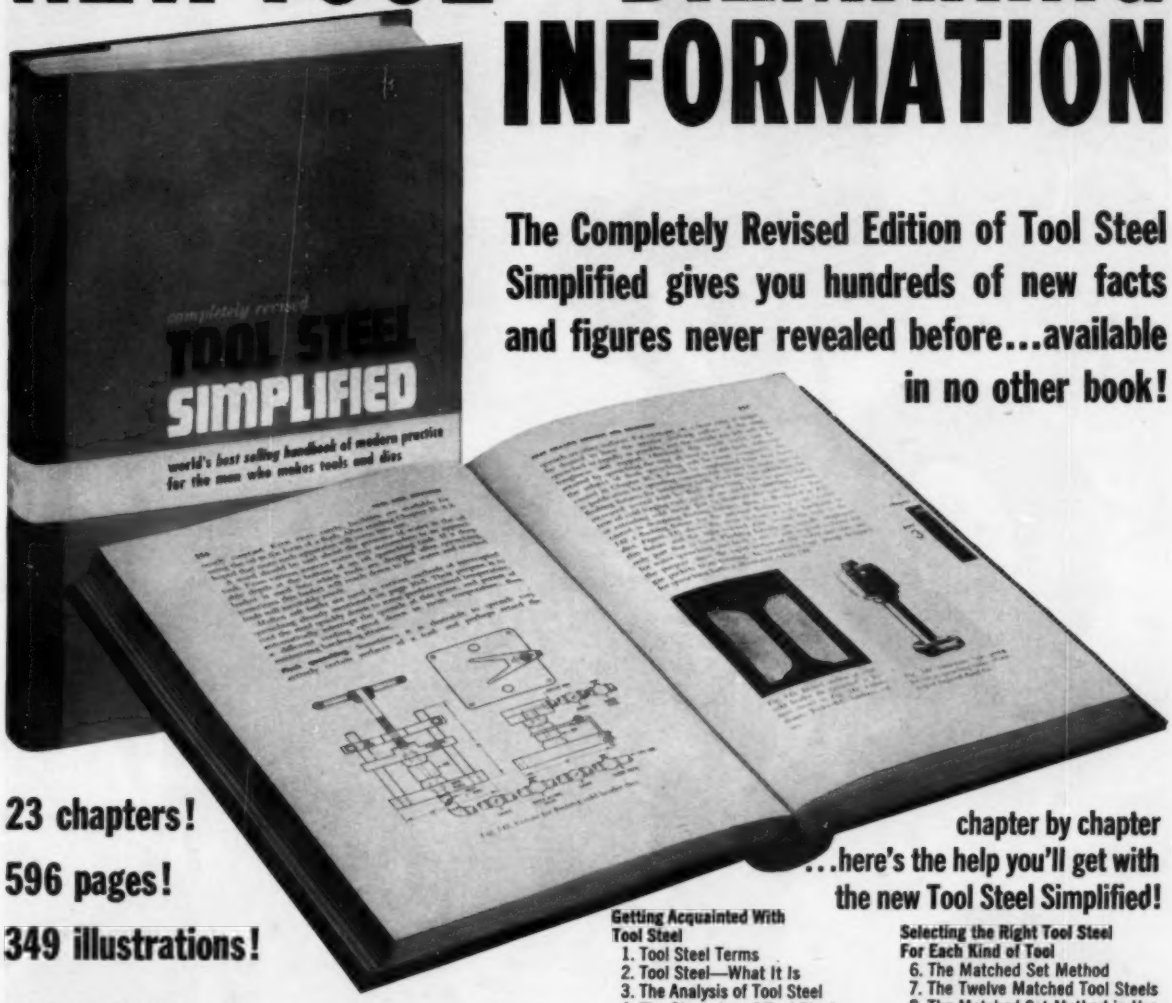
Now, these anti-recession measures are being supported by rising business outlays. All these forces point to rising consumer incomes and spending in the immediate future.

WEEKLY BUSINESS INDICATORS	Latest Week	Preceding Week	Year Ago
Business Week Index of Activity (1947–1949=100)*	149.1	148.1	152.6
Steel ingot operation (thousands of tons)	1,988	1,943	2,102
Electric power output (million Kilowatt hours)	14,278	14,206	13,710
Production of automobiles	129,928	124,454	145,917
Engineering construction awards (*Eng. News-Record*—thousands)	82,677	82,958	79,475

MONTHLY BUSINESS INDICATORS	Latest Month	Preceding Month	Year Ago
Index of industrial production (1957=100)*	105	102	109
Index of durable manufactures production (1957=100)*	99	95	106
Durable goods manufacturers' sales, billions*	13.71	13.32	15.17
Machinery manufacturers' sales, billions*	4.68	4.65	4.75
Durable goods manufacturers' new orders, billions	13.88	13.36	14.64
Machinery manufacturers' new orders, billions	4.68	4.59	4.74
New Orders for Nonelectrical Machinery (1950=100)*	169	159	173
New Contracts for Industrial Construction (1950=100)	131	155	132

* Seasonally adjusted

NEW TOOL AND DIEMAKING INFORMATION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TRENDS

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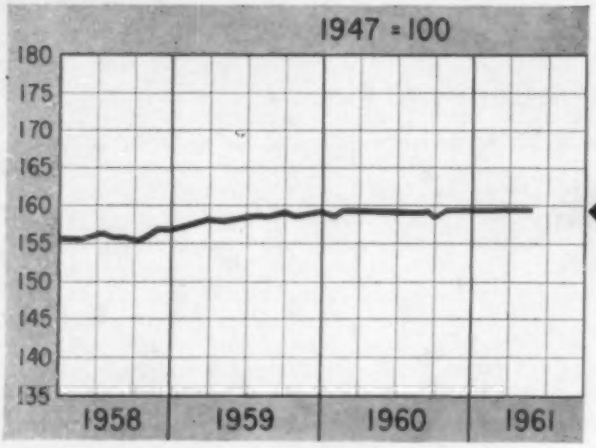

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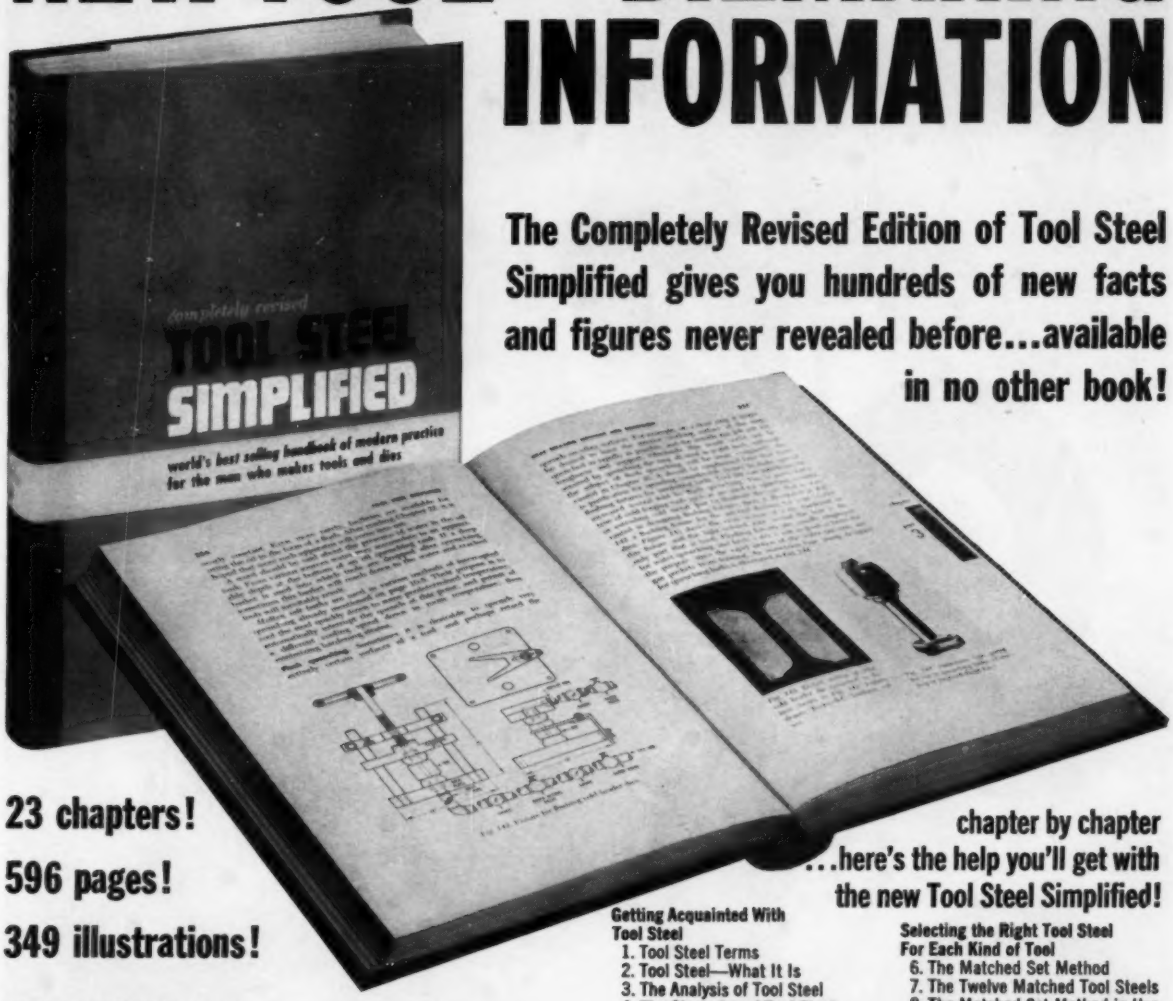
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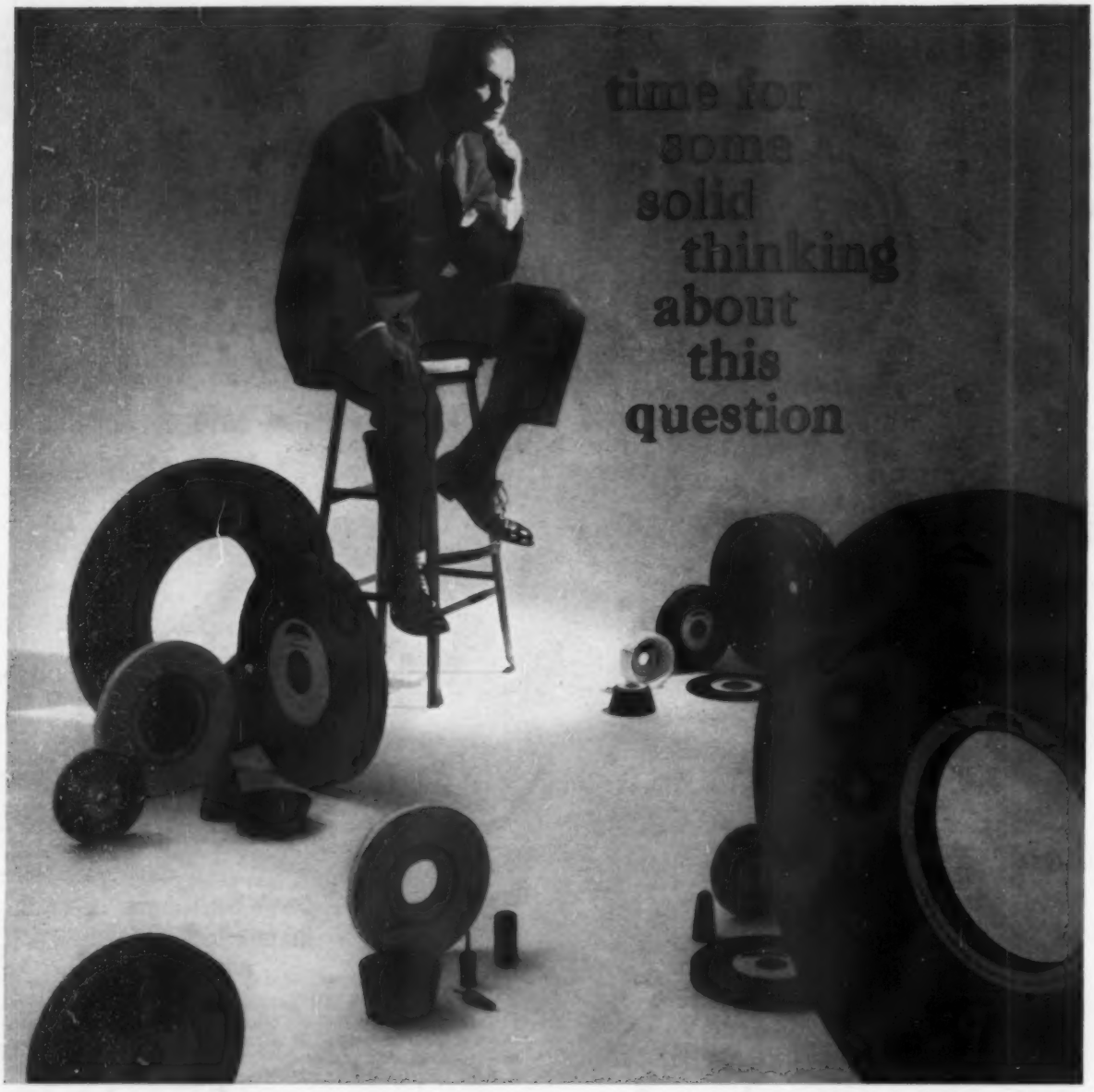

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Accelerated Deterioration

A friend, unfamiliar with the jargon of tax depreciation, said the other day, "What's all this I hear about accelerated deterioration?"

The correct word is depreciation. But in substituting "deterioration" he could not have described more vividly the situation confronting us.

For if we look at the condition of America's physical plant for producing goods and what has happened to it in recent years, accelerated deterioration is the term that best applies to it.

The situation is getting worse rather than better. And right at a time when Soviet Russia is seriously challenging our economic leadership, and our western European allies are pressing harder than ever their competitive advantages.

One good overall measure . . .

of the efficiency of our production equipment is its age. In 1958, only three years ago, the AMERICAN MACHINIST/METALWORKING MANUFACTURING's eighth Inventory revealed that three out of five cutting-type machines installed in U S metalworking plants were ten years old or older.

Our AM/MM Inventories, taken regularly through the years, have shown that America's facilities for making metal products have deteriorated steadily ever since World War II—from 38% (overage) in 1945 to 43% in 1949, to 56% in 1953, to 60% in 1958. Though our next Inventory, the ninth, will not be taken until 1963, AM/MM editors have done some figuring on what the percentage of overage machines is today. They have come up with an estimate of 62% (for details, please turn to the story beginning on page 55).

Obsolescence has not been creeping up. It has been galloping. And it shows no signs of slowing down. Just three years ago, three out of five metal-cutting machines in American industry were at least ten years old. In a few more years, unless something drastic is done to halt the trend, the ratio will be two out of three.

In metal-forming machines, deterioration is even more accelerated than in metal-cutting machines. Our editors estimate that at present 68% of the nation's forming-type machines are ten years old or older. This is a sharp increase in obsolescence over the 62% in 1958.

These fresh estimates . . .

of the unhealthy state of our productive equipment bring into clear focus our dilemma. While the economies of western Europe are expanding and their shining new factories are using to full advantage the new technologies, our machinery is growing older, our costs are mounting and our efficiency is decreasing.

If we are to meet successfully the challenge in world and home markets from our allies and from Communist countries, our productivity must rise at a faster pace. It can do that only if manufacturers have a stimulus to install new and improved machines and processes.

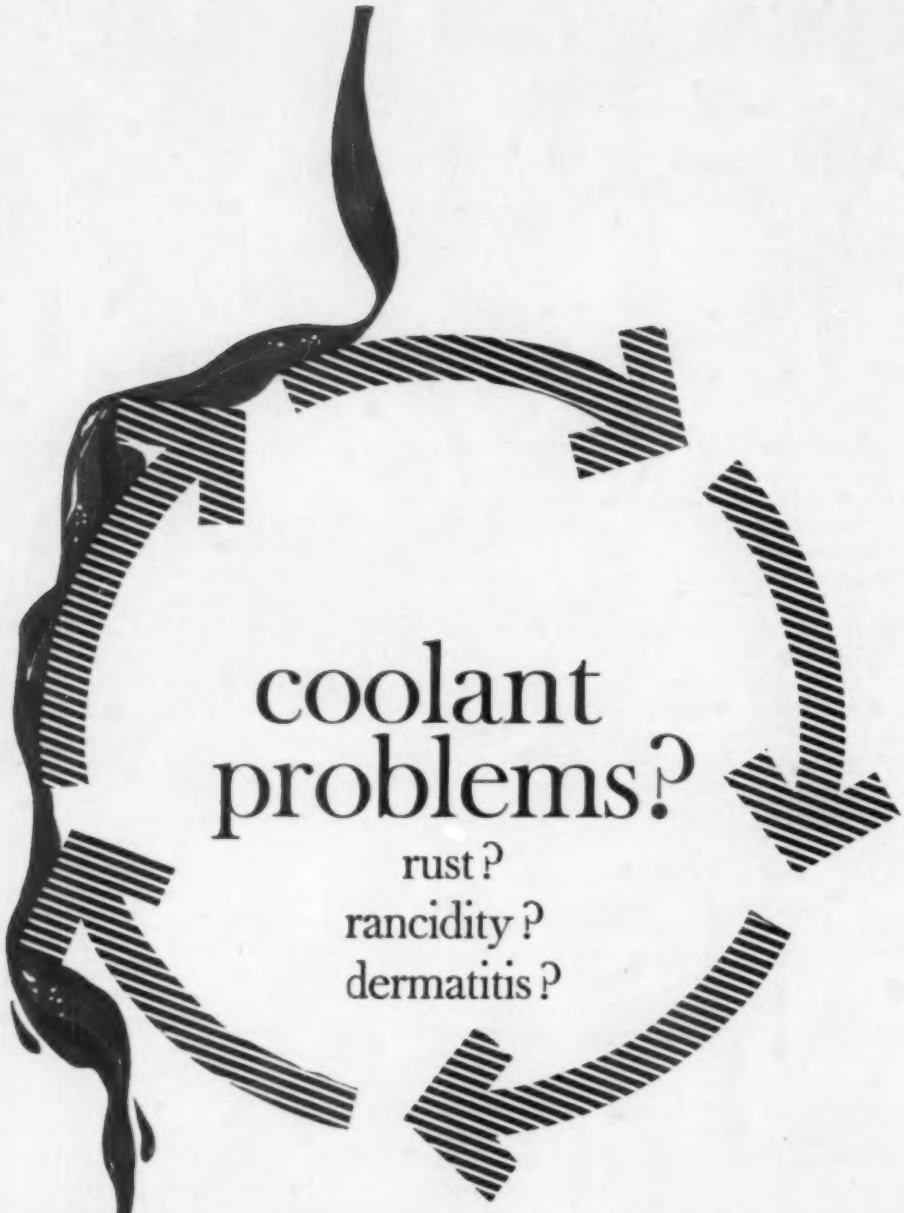
The most practical and quick-acting stimulus would be for Congress to pass legislation allowing faster writeoffs of investments in capital equipment. Legislation need not be complex.

The law now permits . . .

a taxpayer to depreciate in the first year 20% of his investment in capital equipment up to $10,000. If the top limit is removed, he will be able to write off 20% the first year no matter how much he spends. This would be in addition to present allowable rates.

This type of incentive has worked handsomely in other countries. There is no reason why it should not work here. For accelerated depreciation is the best solution to the problem of accelerated deterioration.

Burnham Finney EDITOR



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VOL 105, NO 11 **American Machinist** / *Metalworking Manufacturing* MAY 29, 1961

HOW METAL-CUTTING MACHINE TOOLS HAVE AGED SINCE WORLD WAR II

TYPE	TOTAL MACHINES 1958	PERCENT AT LEAST 10 YEARS OLD					PERCENT CHANGE
		1945	1949	1953	1958	1961	
Boring machines	62,600	34%	43%	55%	58%	59%	+ 1
Broaching machines	12,500	35	31	50	59	63	+ 4
Contour sawing and filing machines	17,500	—	—	36	49	44	− 5
Cutoff machines	94,900	34	33	45	51	49	− 2
Drilling machines	357,800	38	41	53	59	55	− 4
Gear cutting and finishing machines	42,200	30	50	58	64	65	+ 1
Grinding machines	360,600	30	37	53	60	65	+ 5
Honing and lapping machines	20,800	13	24	44	45	55	+10
Lathes	349,100	41	47	58	64	69	+ 5
Milling machines	176,700	37	45	59	61	57	− 4
Planers	12,300	78	75	81	85	86	+ 1
Polishing and buffing machines	82,700	41	39	51	53	56	+ 3
Shapers	35,800	64	63	69	77	79	+ 2
Total		38	43	56	60	62	+ 2

SOURCE: AM/MM

More old machines than ever

62% of metal-cutting and 68% of metal-forming machines now overage, AM/MM editors estimate

America's metalworking industry now has more overage (ten years old or older) machine tools than at any other time in history.

- The percentage of old machines has been rising uninterruptedly since World War II and the end is not in sight.
- 62% of the nation's metal-cutting machine tools are at least ten years old right now. That compares with 60% in 1958.
- 68% of all metal-forming machines are overage today. Only three years ago the ratio was 62%.
- Within two or three years almost two out of three metal-cutting machine tools will be in the overage classification.

This gloomy appraisal of growing obsolescence of the production equipment in the nation's metalworking plants emerges from a study just completed by *AM/MM* editors of what has happened since the *AM/MM* 1958 (Eighth) Inventory of Metalworking Equipment was taken three years ago. The current study, from which the above figures came, is an estimate based on new available data plus the 1958 Inventory statistics.

The study, in effect, is an interim report on the condition of America's machine tools and makes no pretense of being a full-fledged Inventory. The next (Ninth) Inventory will be due in 1963.

The table above, which shows the status of metal-cutting machine tools, and the one on the next page, covering metal-forming machines, include data from the last four Inventories and the current estimates. Also included for reference purposes are summary tables showing the data by industry and by area as it was presented in the Eighth Inventory.

More old machines than ever . . .

METAL-FORMING MACHINE TOOLS: RATE OF AGING JUMPS

TYPE	TOTAL IN 1958	PERCENT AT LEAST 10 YEARS OLD					PERCENT CHANGE
		1945	1949	1953	1958	1961	
Bending & Forming Machines	65,400	46%	50%	51%	54%	62%	+ 8
Wire & Strip Forming Machines	16,800	—	67	57	57	60	+ 3
Hydraulic Presses	33,200	51	37	46	52	55	+ 3
Mechanical Presses	240,600	61	61	63	66	72	+ 6
Punching & Shearing Machines	69,700	—	59	61	63	69	+ 6
Forging Machinery	20,300	48	72	73	80	81	+ 1
Total		57	55	58	62	68	+ 6

SOURCE: AM/MM

Current interest has been stimulated in the Inventory because President Kennedy cited statistics from it to reinforce his request for action to stimulate modernization. (For a current report on the status of the President's tax credit proposals, see page 39).

Four types improve

The one bright spot in the current status is that four types of metal-cutting machines have reversed the trend to obsolescence: Drilling, milling, cutoff, and contour sawing and filing machines show a drop in the percentage at least 10 years old, compared with 1958.

On the other hand, honing and lapping machines have jumped 10% to 55% in the percent overage. Such major machine types as grinding machines and lathes have shown serious increases of 5% in a relatively short time.

For metal-forming machine tools, not one of the six types studied has shown any improvement. Average number of overage machines has climbed 6% and in the case of bending and forming machines the increase is 8%.

The ten-year yardstick

Widely accepted as the best measure of obsolescence and the only source of statistics on the subject, the *AM/MM* Inventory adopted the ten-year yardstick in its First Inventory, published in 1925. This yardstick recognizes that some machine tools do not lose their usefulness at this age limit (neither does a ten-year-old automobile). But it also recognizes that many types of machines are obsolete long before this age, because of advances in design. What the yardstick does is apply a standard which makes it possible to gage the entire machine-tool population.

The new study, in applying the ten-year yardstick, reveals these significant facts: Machines installed in the three-year period that began in 1948 are now more than ten years old. Since 1958, not enough new machine tools have been installed to offset this shift in age categories. And if current shipments of machine tools remain at their disappointingly low levels, there will be no reversal of this trend in the near future.

Results of 1958 Inventory

The current study reinforces the results of the last Inventory, taken in 1958. The most important findings in that study were:

- 60% of machine tools in metalworking were at least ten years old. Of the total, 18% were over twenty years old.
- The number of machine tools in metalworking decreased between 1953 (when the Seventh Inventory was taken) and 1958. Here was the first concrete proof that automation has affected the quantity of machines in the country.
- Machine age in ten of the sixteen industries covered exceeded the national average of 60% at least ten years old. In fifteen of the 24 areas covered, machine age exceeded the national average. (Industry and area tables from the 1958 Inventory appear on the opposite page.)

Productivity vs machine age

The current study confirms another trend noted in the 1958 Inventory: Metalworking is not taking advantage of the significant boost in productivity that new equipment makes possible. A study by *AM/MM* three years ago revealed that 1958 machine tools were 54% more productive, on the average, than those built ten years earlier.

Today the productivity picture is even gloomier. Many new machines on display at last summer's Machine Tool Exposition in Chicago easily outdistance their 1958 counterparts.

The data in this present study are not the result of a new Inventory—such an Inventory requires a year of work on the part of the editors and entails much time and expense on the part of the thousands of metalworking plants that must inventory their equipment.

This study is an analysis by *AM/MM* editors based on Inventory records and all available data from government and industry sources, bringing the best-available judgment to bear in combining this information. Every effort was made to be conservative and if anything, the 1961 figures are understated. •

Copies of the Eighth Inventory of Metalworking Equipment, published in 1958, are available at $2.00 each from Reader Service Dept, American Machinist / Metalworking Manufacturing, 330 W 42nd St, New York 36, NY. This 96-page survey contains detailed breakdowns on machine tools located in 16 industry groups and 24 geographical areas.

SUMMARY OF EIGHTH INVENTORY BY AREAS

	TOTALS MACHINE TOOLS			METAL CUTTING			METAL FORMING			% of Total Equipment	Machines	Machines
	Units	10 yr & over	Over 20 yr	Units	10 yr & over	Over 20 yr	Units	10 yr & over	Over 20 yr	in Each Area	per 100 Employees	Per 1000 Population
Boston	173,040	67%	21%	136,832	67%	20%	36,208	65%	26%	7.8%	54.1	23.7
Bridgeport–Hartford	125,271	66	23	102,657	65	22	22,614	69	28	5.7	54.0	62.6
New York–Newark	202,488	59	15	154,675	59	13	47,813	62	20	9.2	39.8	16.1
Buffalo–Syracuse	100,300	63	21	74,266	64	19	26,034	60	26	4.5	28.3	17.5
Philadelphia–Camden	105,835	62	20	77,041	61	18	28,794	64	25	4.8	28.5	13.4
Pittsburgh–Wheeling	65,247	68	23	45,975	66	19	19,272	71	31	2.9	32.0	9.7
Baltimore	32,045	64	19	26,514	64	19	5,531	67	22	1.4	34.5	10.6
Richmond	38,170	59	14	29,589	59	13	8,581	58	19	1.7	38.6	4.0
Atlanta–New Orleans	45,652	63	18	33,904	63	17	11,748	63	22	2.1	24.8	2.8
Cleveland	126,615	61	19	99,956	61	17	26,659	63	26	5.7	44.2	35.9
Toledo	35,668	54	14	27,130	54	14	8,538	54	13	1.6	42.0	31.1
Cincinnati–Louisville	106,839	63	23	81,038	64	23	25,801	61	24	4.8	42.0	20.8
Detroit	228,408	56	18	180,682	55	16	47,726	59	28	10.3	41.2	48.9
Indianapolis	75,007	61	19	55,604	60	16	19,403	63	27	3.4	36.9	25.1
Chicago	325,304	59	17	246,778	59	16	78,526	59	20	14.7	39.7	26.2
Milwaukee	93,146	68	24	73,852	68	21	19,294	70	35	4.2	40.2	30.1
Minneapolis–St. Paul	30,652	57	17	22,891	56	14	7,761	60	25	1.4	38.8	8.7
St. Louis	43,984	68	17	30,623	69	16	13,361	66	19	2.0	26.5	5.7
Kansas City–Tulsa	27,425	60	13	19,211	58	11	8,214	66	17	1.2	22.4	5.1
Dallas–Houston	38,087	45	10	28,036	43	9	10,051	49	13	1.7	26.9	4.1
Denver	20,623	63	11	17,050	62	9	3,573	69	19	0.9	52.9	3.4
Seattle–Portland	15,437	68	18	12,135	67	17	3,302	72	25	0.7	18.2	4.0
San Francisco	27,202	58	16	21,230	58	17	5,972	55	12	1.2	29.6	6.0
Los Angeles	135,297	41	4	109,318	39	4	25,979	46	6	6.1	26.9	19.5
Total	2,217,742	60	18	1,706,984	60	16	510,758	62	23	100.0%	36.7	14.7

SOURCE: AM/MM

SUMMARY OF EIGHTH INVENTORY BY INDUSTRY

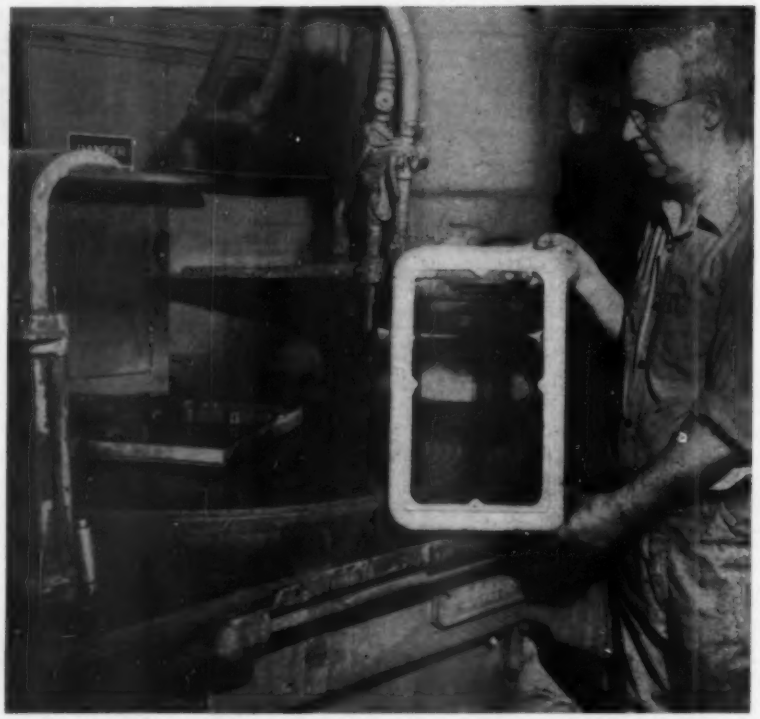
	TOTAL MACHINE TOOLS			METAL CUTTING MACHINES			METAL FORMING MACHINES			% of Total Equipment	Machines
	Units	10 yr & over	Over 20 yr	Units	10 yr & over	Over 20 yr	Units	10 yr & over	Over 20 yr	In Each Industry	Per 100 Employees
Farm Machinery	56,989	72%	27%	45,239	72%	26%	11,660	72%	29%	2.6	51.5
Construction, Mining, Mat. Hdlg.	74,599	63	21	62,496	64	20	12,103	59	24	3.4	36.6
Metalworking Machinery	178,884	62	17	169,304	62	17	9,580	60	23	8.1	67.7
Special-Industry Machinery	91,273	71	23	81,472	71	24	9,801	69	31	4.1	58.4
General Industrial Equipment	160,612	67	19	145,926	66	18	14,686	70	29	7.3	48.5
Fabricated Metal Products	517,860	61	19	326,317	59	16	191,543	65	25	23.3	48.7
Office and Service Machines	94,622	65	24	71,351	66	23	23,271	63	27	4.3	44.5
Electrical Equipment	164,665	57	18	111,406	57	16	53,259	58	21	7.4	31.0
Household Appliances	40,082	64	17	28,830	66	16	11,252	57	17	1.8	29.7
Communications Equipment	72,520	42	7	53,524	42	6	18,996	42	9	3.3	18.5
Motor Vehicles and Parts	163,885	47	20	124,874	46	18	39,011	50	25	7.4	27.0
Complete Aircraft	34,122	51	1	24,962	50	1	9,160	52	1	1.5	8.2
Aircraft Parts	131,323	50	4	116,076	50	3	15,247	49	6	5.9	41.2
Precision Mechanisms	98,091	59	16	81,216	59	15	16,875	60	21	4.4	38.9
Ordnance, Shipbldg., Rways.	92,287	73	20	81,543	72	19	10,744	78	30	4.2	29.7
Forge Shops, F-dries, Misc.	245,928	60	17	182,358	59	16	63,570	63	21	11.0	34.1
Total	2,217,742	60	18	1,706,984	60	16	510,758	62	23	100.0	36.8

SOURCE: AM/MM

GRIND away cutting costs

Abrasive machining — removing up to ¼ inch of metal with a grinder—can reduce costs in five different areas. One or a combination of them will often reduce metal removal costs

By Leo P Tarasov
and Richard H Merritt
Norton Co, Worcester, Mass



Grinding ¼ inch from each face of this motor base saves $0.45 and 5.46 min per piece

Two recent studies at our plant show —when all cost factors are considered—that abrasive machining is often the most economical method for machining a part. Look at the results of these studies (itemized on the opposite page):

- Savings of $1.30 per piece (on a face plate) is primarily the result of reducing machining time to only 40% that of the vertical boring mill used for comparison in Study A.
- The more economical method would be missed if tool costs were excluded from Study B, because the $0.45 saving on the motor base is given by reduced tool costs and a piece-handling (largely chucking) time almost half that on the vertical milling machine. There is also the 20-minute reduction in setup time here.

Where do savings occur?

The studies are based on five major considerations, all of which are important factors in achieving productivity:

1. Setting-up time and costs
2. Machining time and costs
3. Machine operating costs
4. Tool costs
5. Cost of losses.

Setting-up time favors the surface grinder in many machining operations because conventional cutting tools often require more extensive fixturing and clamping, while the grinder's magnetic table will usually suffice. Study B illustrates this quite well, as can be seen by comparing the 34 minutes for the miller with 14 minutes for the grinder.

The specific factors considered under machining costs are outlined in the accompanying table. Other factors might be present in a specific application, however, and should be added in for accuracy.

Machine costs

As can be readily seen, we have considered only machine operating costs in our study. But what about actual machine costs?

Our company uses an hourly rate, by department, that averages depreciation costs of all machines in the department. Thus, the $4 hourly rate includes average cost of using any machine in the department. However, initial cost of the grinder and vertical mill was about the same; the vertical boring mill was somewhat more expensive.

Therefore, if a study were made by a company that uses the machine-hour rate in cost accounting, savings would be approximately the same in Study B, and would be even greater in Study A.

Cutting tool fallacy

A common accounting practice discriminates against grinding wheels. In many companies, the cost of cutting tools and their maintenance is considered overhead expense, while abrasive wheels are listed as a direct expense. Many machine shop supervisors now believe that cutting tools "don't cost anything to use." this obviously erroneous "paper saving" may be preventing a real money saving.

If, for accounting purposes, both are considered as a direct expense, the cost of the operation will show up in its true relationship. This has been pointed out in examining the figures of Study B.

On the other hand, to decide on a machining method merely on the basis of tool costs is equally fallacious, and can lead to the selection of the more costly process. The figures of Study A bear this out.

Other advantages

The advantages of abrasive machining will be realized when industry recognizes it as a process with several facets (the abrasive wheel is not merely a substitute for a cuting tool):

COMPARATIVE ANALYSIS OF ABRASIVE MACHINING COSTS

OPERATION:	STUDY A				STUDY B			
machine ⅛ in. off top and bottom	Part: 36-in. OD face plate Material: Boiler Plate				Part: Motor Base Material: Gray Iron			
FINISH:	Cutting Tool		Abras. Wheel		Cutting Tool		Abras. Wheel	
commercial flat & parallel	(a)		(b)		(c)		(d)	
	Time (min.)	Cost ($/pc)	Time (min.)	Cost ($/pc)	Time (min.)	Cost ($/pc)	Time (min.)	Cost ($/pc)
MACHINING COSTS*								
Handling the piece	8.50	.567	5.50	.366	**12.50**	.835	**7.00**	.467
Positioning the tool(s)	2.00	.133	1.30	.087	1.00	.067	—	—
Machining or cutting	69.50	4.640	22.40	1.495	7.68	.513	9.72	.648
Measuring	.50	.033	2.00	.133	5.00	.334	4.00	.267
SUBTOTAL	**80.50**	5.373	**31.20**	2.081	26.18	1.749	20.72	1.382
MACHINE OPERATING COSTS								
Power		.425		.273		.031		.068
Maintenance		.121		.103		.042		.068
SUBTOTAL		.546		.376		.073		.136
TOOL COSTS								
Replacement		.771		3.280		.230		.382
Sharpening (labor, fringe)*		.193		—		.276		—
Sharpening (grinding wheels)		.239		—		.018		—
SUBTOTAL		1.203		3.280		.524		.382
TOTAL COST PER PIECE		7.122		5.737		**2.346**		**1.900**
SETTING-UP COSTS*	15.00	1.000	14.00	.933	**34.00**	2.268	**14.00**	.933
	SAVED: $1.39 per piece 49.30 minutes 1 min. setup time				**SAVED:** $0.45 per piece 5.46 minutes **20 min. setup time**			

*Use rate of $4.00 per hr
(a) Vertical boring mill, single point tool
(b) Vertical spindle surface grinder
(c) Vertical milling machine, 8-in. face mill
(d) Vertical spindle surface grinder

• Less extra stock is required on parts such as castings and forgings. Because the abrasive wheel cuts as readily through tough scale and hard spots as it does through solid metal, only enough extra stock need be specified to permit scale removal and allow for warpage during heat treatment. This saving of metal can represent a substantial cost saving and, in this area, design engineers can make a significant contribution toward economy.

• Another advantage of abrasive machining is that heavy stock removal and final finishing can often be accomplished in a single setup. The reduction of handling time represents significant savings.

• Also, because abrasive wheels used for heavy stock removal are self-sharpening tools, there is a minimum of downtime required for tool changes, and there is no tool reconditioning cost.

The horsepower myth

High rates of stock removal have been consistently achieved with abrasive wheels in proper applications. In flat grinding of high-strength cast iron, a metal removal rate of 35 cu in./min is practical on a production basis. Only about 100 hp is needed to remove metal at this rate.

This ratio of 3 hp for 1 cu in./min refutes the long-held belief that at least 10 hp is required to remove 1 cu in./min with an abrasive wheel.

Special equipment?

As has been mentioned, replacing of milling cutters with abrasive wheels is already being applied to machining of large, flat work where heavy stock removal—as much as a quarter of an inch—has been done on specially built surface grinders. Because this type of equipment is already available, initial successes will be most common in this area.

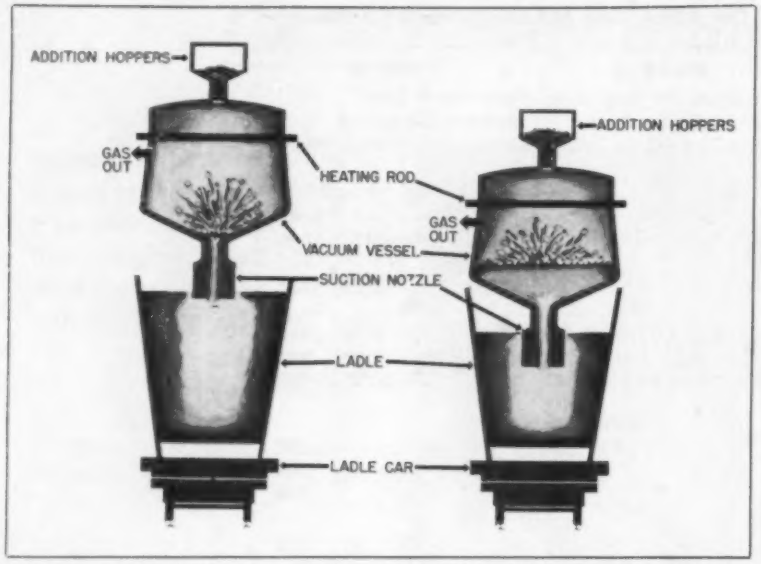
However, the machine shop superintendent can use abrasive machining if he now uses abrasives at all. The expanded use of abrasives into the area of heavier stock removal will, in most cases, be just an extension of grinding methods already being used for more normal operations.

Even with present grinding equipment, some of the savings outlined here can be achieved if present operations are reviewed with an unprejudiced eye and a little imagination.

Areas of success

One of the country's leading makers of machine knives forms the wedge-shaped cutting edge of heavy blades entirely with abrasive wheels, removing as much as a half-inch of stock at the high point of the triangular cross-section.

On one machine for making taps and drills, the flutes are ground to final dimensions and finished in a single pass from a solid piece of hardened steel. And grinding of grooves in rod mill rolls takes as little as half the time required when grooves are first turned and then ground. In addition, grinding from the solid permits the use of harder steels. This naturally increases roll life. •



D-H vacuum vessel moves up and down to circulate steel for degassing and alloy additions. In lower position (right), it contains 10% of steel in 200-ton ladle

Difference per pound: about 1 cent

"Silex coffeemaker" degasses steel

Resembling nothing quite so much as a giant Silex coffeemaker in operation, a new vacuum degassing process is now turning out higher-quality steel at a very small premium (about 1¢ a pound) over the cost of open hearth steel.

Not only that, the new D-H (Dortmund-Horder) unit at Crucible Steel Co's Midland, Pa, Works is turning out the steel in heats as large as 200 tons, or as small as 35 tons. The premium of about a cent a pound compares with about 25 to 30¢ per pound for vacuum-arc-remelted steel and 50 to 75¢ per pound for vacuum-induction melted steel.

Does more than degassing

D-H is not only a vacuum degassing process, it is also an alloying process which can bring steel composition under extremely close control by adding small increments of alloy materials after the gases have been removed.

D-H's major benefits stem from the fact that nonmetallic inclusions and gases are removed from the steel to a point where nonuniformities and discontinuities are greatly reduced in the finished steel.

The steel produced this way "fits into the spectrum of quality someplace between normal electric furnace quality and vacuum-arc melted quality," according to E A March, Crucible's director of technology.

He adds, "What we will accomplish for the customer is to produce a higher level of quality at a very modest increase in cost—a more uniform quality and fewer rejections."

The improvement in uniformity comes partly from the degassing effect of the process, partly from the violent stirring action the steel is put through.

Such uniformity is not only in the looks of the steel, in the fact that voids and inclusions are largely eliminated. Mechanical properties, too, are more uniform. In test results, they show a much narrower spread than those of open hearth steel, or even electric furnace steel.

The process works this way: After a heat of steel is poured from either an open hearth or electric furnace, the ladle is placed on a car which moves it under the D-H vessel (see illustration).

The vessel, mounted on four hydraulic pistons, has been preheated to 2700 F by a "glow rod" powered by a 600-kva transformer.

To start the process, the hydraulic pistons lower the vessel until its protruding snorkel (suction nozzle) penetrates the metal a predetermined depth. This level then becomes the upper limit of travel for the reciprocating action that follows—at least 38 up-and-down cycles.

A five-stage ejector system then pulls the atmosphere in the vessel down to one-thousandth normal pressure — enough vacuum to support a column of steel about 59 inches high. Then, when the vessel descends to its lower limit, the 59-inch column includes a "lake" of molten steel in the vessel.

Treats 10% each cycle

At this point, the vessel contains about 10% of the steel from the ladle. After a short dwell at this level, during which the gas in the steel boils off rather violently, the vessel rises to its upper limit.

But because the vacuum in the vessel can support only a 59-inch column of steel, the lake of molten steel rushes down through the nozzle into the ladle, causing a violent stirring action.

The vessel goes through 32 of these up-and-down cycles before alloying additions are made, so as to make sure that the metal is thoroughly degassed. Correctly portioned amounts of alloy elements are then released from vacuum-tight hoppers on a time schedule dictated by the solution rate of the alloy. The final treatment phase consists of six mixing cycles to promote homogeneity.

Processes many steels

In the first 100 heats processed (the unit went into action last September), Crucible reports good results with a variety of carbon and alloy steels, including H-11 tool steel.

"This is the first D-H vacuum processing unit in this country," says March (it's a West German development), "and the largest in the world that we know of, either in existence or on the drawing boards."

One side advantage of the large capacity will be lower inspection costs for the customer. Many metalworking companies that make a rigid inspection of each melt will gain from the "large economy size." •

Ratios reveal handling wastes

Just how efficient is your materials-handling operation? With the help of seven new ratios, derived from easy-to-get data, you can spotlight needless handling expenses.

Developed by the Yale Materials Handling Div of Yale & Towne, the ratios provide a uniform way to pin down elusive elements in a plant's handling setup. Handling expert James R Bright of the Harvard Business School worked with Yale to develop the new guides.

Field-tested in several plants, the ratios have produced striking savings. One maker of oil-well equipment, for example, now saves $18,000 a year just from improved shipping and inspection of barstock. And a warehouse has boosted output 100% through improved communications between supervisors and fork-truck operators.

The new ratios

Here are the ratios, each of them aimed at expensive areas in plant handling:

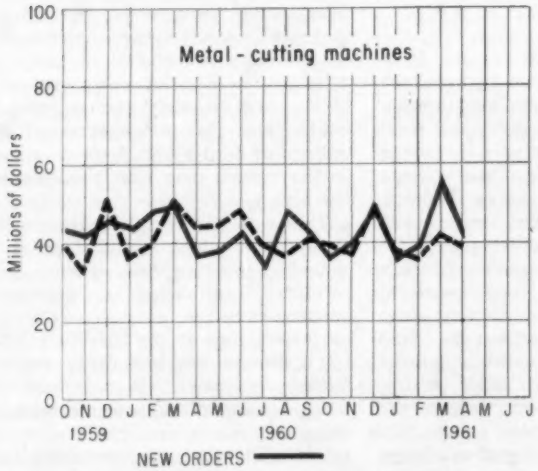
- Materials-Handling Labor Ratio = Workers assigned to MH duties ÷ Total operating workforce. *This ratio simply asks: How big a job is materials handling in our company?*
- Direct - Labor Handling - Loss Ratio = MH time lost by direct labor ÷ Total direct-labor time. *Here is an indication of how much direct-labor time is lost because skilled workers are having to handle materials, thus reducing their productive time.*
- Movement/Operation Ratio = Total number of moves ÷ Total number of productive operations. *The answer here can show just how efficient handling actually is. If, say, seven moves are required to move material through one operation, the average plant is probably wasting money here.*
- Manufacturing-Cycle-Efficiency Ratio = Sum of all production cycle times ÷ Elapsed time in the production system. *Here is a comparison of the time required for productive work to the total time that elapses in the factory. Few job shops, Yale states, will have a ratio here as high even as 10%.*
- Space - Utilization - Efficiency Ratio = Cubic feet usefully occupied ÷ Net usable cube. *This ratio reveals how effectively a plant is making use of its enclosed space.*
- Equipment Utilization Ratio = Actual output ÷ Theoretical Capacity. *Here is the answer to the question: "Are we operating our production machines at a reasonable percentage of their capacity?"*
- Aisle-Space Potential Ratio = Current aisle space *minus* optimum aisle space ÷ Current aisle space. *Especially pertinent to storage areas, this ratio can point the way to several improvements: Do we have any unnecessary aisles? Are aisles too wide? Could we save space by investing in narrow-aisle equipment?*

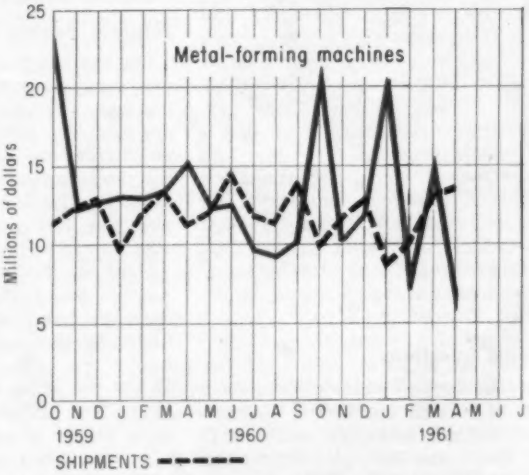
How to use the ratios

By compiling the ratios at regular intervals, and examining up or down movement for each, a company can see whether there has been an actual improvement in its materials-handling setup. If handling accounts for between 20% and 30% of a product's cost, yet contributes nothing to its intrinsic value, it obviously should be a target in any cost-reduction program. The ratios, by giving management a concrete way to evaluate these expenses, can be a valuable set of tools to any plant.

Yale has prepared a booklet, available without charge upon request, that thoroughly explains the new ratios. With the booklet, a plant can calculate its own performance — worksheets are provided for calculations where necessary. •

NMTBA Index of machine tool new orders and shipments





Net new orders for metal-cutting machine tools dropped off in April to $41,550,000, according to preliminary figures from the National Machine Tool Builders' Association. March orders stood at $54,900,000. Shipments in April dropped to $39,450,000, off from $42,050,000 in March. Orders for metal-forming machine tools dropped off sharply in April to $6,350,000, down from $15,150,000 in March. Shipments rose to $13,600,000 in April, up from $12,800,000 in March

QUESTION: Can you figure out an agreeable way to create industrial goodwill, give your customers a better insight into your problems, give yourself a head start on some of theirs, and mutually improve everyone's understanding of technology?

Vickers comes up with some answers

It's no circus, but a serious, sometimes sticky and occasionally humorous transfer of technical know-how, detailed terminology and cautiously revealed improvement in the art—the fourth edition of Vickers Inc's Fabricating Machinery Hydraulic Conference, held May 16 and 17 at Detroit's Sheraton-Cadillac.

Speeches weren't particularly polished, presentations weren't especially brilliant, but the two-day meeting fostered a solid two-way exchange of ideas, and was in many respects more to the point and better controlled than many a society technical meeting.

After-the-meeting consensus: Well worth the time and effort—for the sponsors *and* the audience.

The program was a well-paced mixture of dissertation and discussion, punctuated by questions, disagreements, complaints, but no downright arguments (at least in public). Presentations included a paper by M R Euverard of AMF on bread-making machinery and how it is hydraulically powered, a talk by R G Spencer of Vickers on hydraulics involved in paper-laminating equipment, and a paper by Lloyd Kovacs, Midland-Ross Corp, on hydraulic circuits for blow-molding plastic products.

Interspaced were discussions on submitted questions, moderated by Uel Jennings, DuPont Development Laboratory, and David Sloane, Lester Engineering Co. The one out-and-out commercial was a movie, "Controlled Power."

Typical questions

Are air-controlled hydraulic valves soon to be a strong factor? How do oil-immersed solenoids work out? Are there any tell-tale devices for four-way valves? Will straight threads soon replace pipe threads in standard hydraulic-power fittings? These typical questions were answered formally by well-briefed Vickers personnel, and often as not the official answer prompted a minor argument—or at least a difference of opinion.

On straight threads vs pipe threads, there has been so little demand for the several models made available with straight thread, Vickers figures the changeover is a waste of time. From the floor came opinions that pipe threads should be replaced, indicating fairly strong interest. Unanswered question: Where were these people when Vickers was looking for orders for the straight-thread lines? Final status of the question: indeterminate.

Where are air-controlled hydraulic valves most useful and most often applied? Again, Vickers indicated little commercial action, commenting that the idea needs more development. In high-temperature applications, they show promise because they work when coils or switches for electrically operated hydraulic equipment fail.

Tell-tale devices

On the tell-tale device for four-way piggy-back valves, Vickers took the tack, "You tell us (how to manage it)." The idea is good, and comment from the floor was favorable. But ideas on how to make it work economically were scarce. Buttons, plungers, right-angle levers, and other ideas were mulled around.

How do oil-immersed hydraulic valves work? Fine (no argument from the floor). How can we reduce hydraulic failures when the fluid cannot be kept absolutely clean? Mount the valve with spool vertical so the dirt tends to fall free of the areas where it can clog up the action. How about standard markings on the valve body and electrical leads [so they are keyed together to indicate which wiring arrangement will produce fluid at which opening and going in which direction]? Fine idea (but no system decided upon).

Can certain compensated flow-control valves be operated as variable-speed timing drives? Yes, under certain conditions—namely, in the larger sizes where temperature and pressure do not vary too much, where the fairly constant effect of temperature variation is only a minor proportion of the total flow.

Questions of pump action, valves, hydraulic circuits and systems, and fluids, as well as maintenance and training, were spaced around talks on high-speed servos on turret punch presses by Walton Rainey, Wiedemann Machine Co, selecting hydraulic drives for glass-forming machinery by William Stutske of Kimble Glass Co, and fluid-motor applications by Orville Johnson of DuPont.

Working pressures

Considerable time was given to high pressure—including a floor question about 10,000 psi. In some cases, even though gages indicate much lower pressures, there may be instantaneous pressure peaks as high as 9000 psi; but operating equipment for 10,000 psi is not currently ready, and may be far in the future. For current designs, and with expected improvements, 5000 psi seems to be a working maximum.

Problems with synthetic fluids (non-flammable) may be eased a bit in the near future with seals that are compatible with both synthetic and petroleum products. This could simplify seal stocking and inventories.

The heat problem also got a workover, with Vickers recommending that minor circuit changes be checked to eliminate the causes of heat. A 1-hp loss at a relief valve can cost 20,000 btu in eight hours, which could raise the temperature of 20 gallons of fluid 340 F. A check valve in the system may nearly eliminate the loss.

This was Vickers' 20th Hydraulic Conference, which included aircraft industry, machine tool, marine and ordnance, and fabricating-machinery sessions over the last dozen years or so. Attendance at the current meeting was about 150, including some 40 Vickers personnel. It was not as large as some engineering society meetings, but it *was* confined to a select audience of people intimately connected with and interested in hydraulics—a group that has considerable effect on future hydraulic designing and planning. •

Printed coils cut press time

Twice as many parts per hour and much lower tooling costs are claimed for progressive-die stamping when the press is fed with coils of pre-printed strip instead of pre-printed sheet stock. The advantages of coiled strip are well known, of course, but for printed or lithographed metals, they've been only a hoped-for goal until now.

The major problem has been how to maintain registration through the printing process and then through the stamping operation. The printed impression has to be located on the coiled strip so that, when it is subsequently fed through progressive dies, the printing will be accurately positioned on the finished part.

Mechanical registration

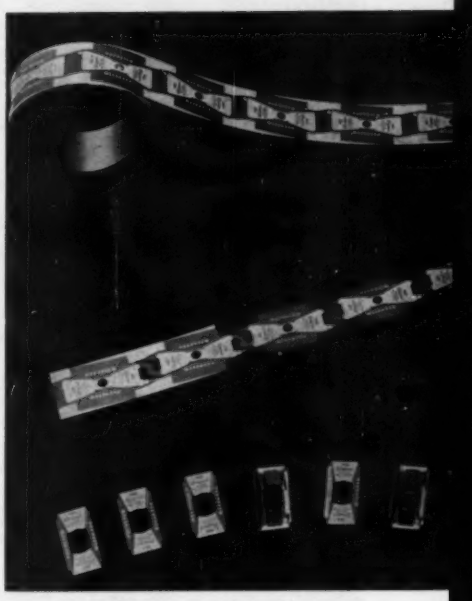
The new technique, developed jointly by the Parts Division of Sylvania (a subsidiary of General Telephone & Electronics Corp) and Litho-Strip Corp, solves the problem by mechanical registration and holds a tolerance of ±1/32 in.

The first part turned out on a production basis is the top for Gillette Super 10 razor blade dispensers, shown here. It's a two-color printing job, one part wide, but the developers say that three-color work is also possible. Present limits on the strip are 0.008 to 0.020 in. in thickness and a maximum width of 15 in.

Holes locate two operations

Strip for the Gillette dispenser top is first punched with registration holes that control the strip's progress through the printing operation at the Litho-Strip plant in Chicago. These same holes then locate the strip in the progressive dies at Sylvania's plant in York, Pa.

M W Kremer of Sylvania says that the process can be applied to virtually any high-volume, printed-metal part, including such items as flashlight battery tops, tape dispensers, toys, drawn cans and caps, metal boxes, and fuse tops. Coatings can be epoxies, alkyds, vinyls, acrylics, and phenolics. •



Tops for Gillette razor blade dispensers are turned out from printed coil stock

Spotwelding foils for spacecraft

Spotwelding of foil-thin sheet metal to plate and bars, long a headache for the aircraft and missile industries, has been put on a production basis at Ryan-San Diego.

Gone are the weak, unsatisfactory joints produced by ordinary resistance-welding methods that form a weld nugget in the heavier section instead of at the interface of the two materials.

Now, Ryan resistance-welds ultra-thin sheet (0.00025 to 0.016 in.) to heavier sections, producing a uniformly accurate and securely bonded structure.

Simple, safe and convenient, the new method is based on producing a weld with interface resistance, rather than with the resistance of particular materials.

How it works

Essentially, it works this way: A welding electrode is applied under heavy unit pressure at the spot to be welded. Then the control unit releases a heavy pulse of current, and contact pressure is kept up until the weld nugget has cooled.

Welding equipment consists of a condenser-discharge machine (the power source), a timer, and a pressure mechanism.

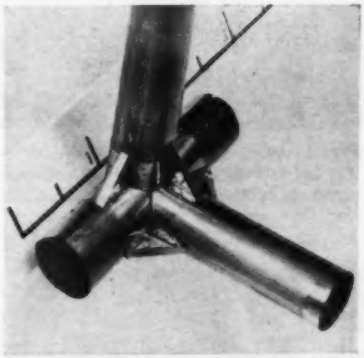
A wheel-type electrode, under constant pressure to hold the sections in intimate contact at the point of weld, rolls along the surface of the work, producing evenly spaced spot-welds. Other types may be used.

Current is released through the primary winding, pulsing welding current to the secondary winding — so that a heavy current at low-voltage flows through the electrode on the work surface. (About 40,000 amp at 2 volts is satisfactory).

As welding current is applied, heat builds up at the interface (the area of greatest resistance) so that the weld nugget forms equally at the contacting faces. The weld nugget solidifies almost immediately, but not before the electrode pressure is removed, or before a satisfactory forging action is completed.

Distortion is negligible

The weld nugget is small, and surface distortion from follow-up pressure is negligible. Of course, the pressure system is precisely controlled to avoid cracking as a result of the rapid quench.



Foil-thin titanium parts are welded into actual spacecraft structure. Process makes sound joints, either foil-to-foil or foil-to-heavier section

A wheel electrode, running at 15 ipm (to make 10 welds per inch), will maintain electrode pressure long enough to avoid cavitation. Other welding methods, with longer weld times, throw so much heat into the weld that it cools slowly, making it difficult to maintain complete follow-up pressure. This is not the case in welding done by the new method. •

Automatic

In spite of talk that U S products are priced too high, many American manufacturers have managed to hold their own in world markets, simply because competition spurs ingenuity. Here is a prime example of how improved methods have lowered prices and regained customers against stiff foreign competition

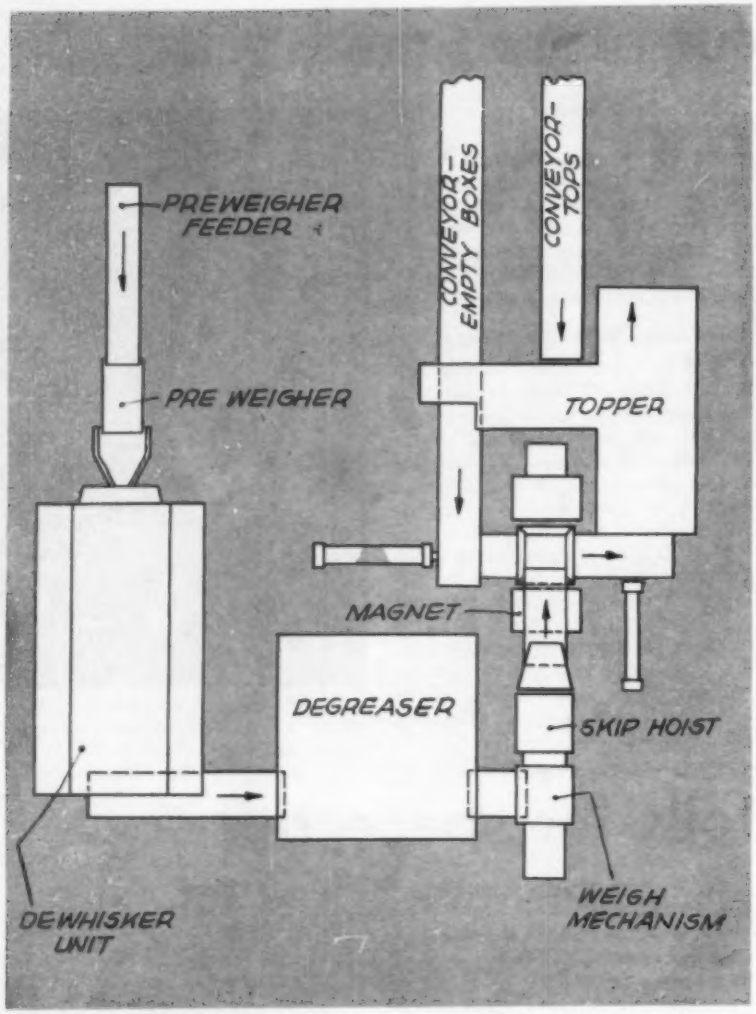
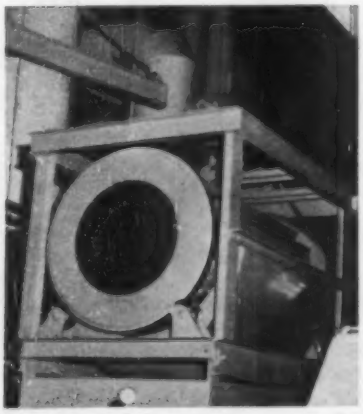


Fig. 1—Automatic line processes nails through preweighing, dewhiskering, degreasing, batch weighing, packaging, and box-topping. Carefully pitched roller conveyors eliminate manual material handling



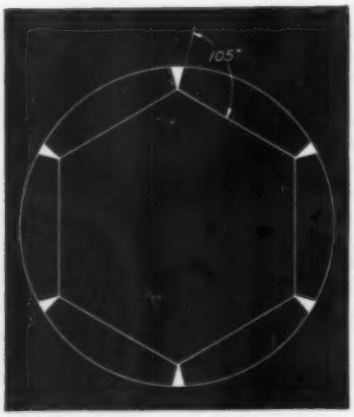


Fig. 2—Tumbler unit removes whiskers, dulls points, and deburrs the nails. Heavy end plates for unit are made of six segments welded together; 105° angles provide bevel joints for welding the segments of each end plate together

The challenge of foreign competition with its low labor costs has been particularly tough for the manufacturers of low-priced, high-volume products such as nails. However, at least one nail maker is meeting the challenge by installing more efficient processing and packaging equipment.

A new, automatic line has helped to cut prices and reverse previous sales losses to low-priced competition, according to a recent paper submitted in the James F Lincoln Arc Welding Foundation Machine Design Competition.

The authors of the paper, Eugene I Odell and Stanley H Steketee of the Dake Corp, Grand Haven, Mich, say that one man can now process the same volume of nails that formerly required five. One reason for such a significant reduction is that the line eliminates manual material handling. A system of carefully pitched roller conveyors moves the product from one end of the line to the other.

Line does many jobs

Nail processing after manufacture involves a number of operations: preweighing, dewhiskering, degreasing, batch weighing, packaging, and topping the boxes. The layout of the automatic processing line developed by the Dake engineers is shown in Fig. 1.

Lower costs for the nail manufacturer are not the only savings connected with this processing line. The authors also tell how costs were held down in fabricating the line itself, largely by employing arc-welded steel in constructing the system elements.

The advantages of welded design,

line slashes nailmaking costs

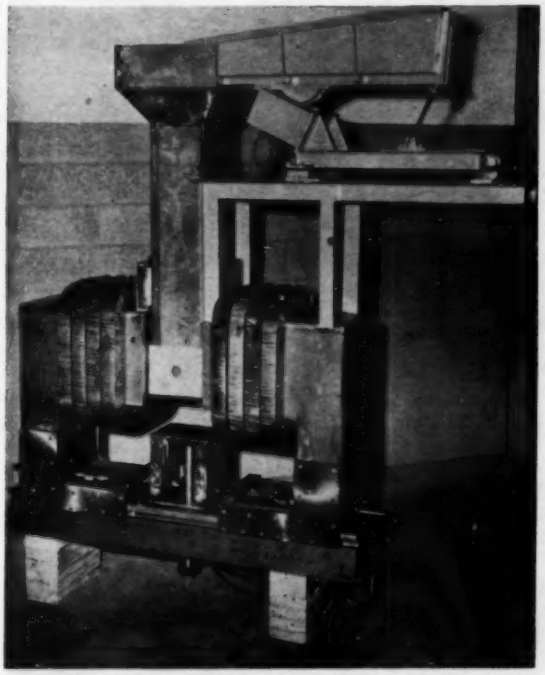


Fig. 3—Electromagnet aligns nails for packaging. Pole pieces of magnet are flame-cut from 12-in. plate

Fig. 4—The two boxes hold some quantity of nails, but the nails were magnetically aligned in one and not in the other

they say, are that it lowers manufacturing cost, eliminates capital investment in patterns for castings, and provides greater flexibility in design. One interesting example is the application of arc welding in making the end plates for the dewhiskering unit (tumbler) shown in Fig. 2.

The plate on one end of the unit is 2 inches thick, and the one on the other end is 4 inches thick, with an outside diameter of 40 inches before finishing. The thicker end supports the 123-tooth, 1-inch-pitch drive sprocket.

Six pieces make end plate

Instead of being cut out as single pieces, these end plates were each made from six separate segments. The segments were cut from hot-rolled 1020 steel plate and then welded together to form the end plates. Notice that the ends of the segments were cut at 105° instead of the 120° indicated by the hexagonal shape. This automatically provided a 30° bevel joint for welding.

Sounds like a time-consuming procedure, but it actually saved money in fabrication. If each part had been made as a single piece by cutting it out of a large plate, the whole hexagon burned out of the middle would have been scrap, because there's no call for material of this thickness and size.

For the 4-inch part alone, this would have amounted to over 1200 pounds of scrap. Therefore, the material savings more than offset the five hours of welding required by the six-piece construction.

Another interesting piece of equipment in the processing line is the electromagnetic packer (Fig. 3). This device aligns the nails so they occupy the least space in the shipping carton.

First, a skip hoist dumps a 50-lb batch of nails into the vibratory hopper at the top of the packing machine. Then the hopper feeds the nails into the non-magnetic stainless steel chute whose lower end is inside an empty carton.

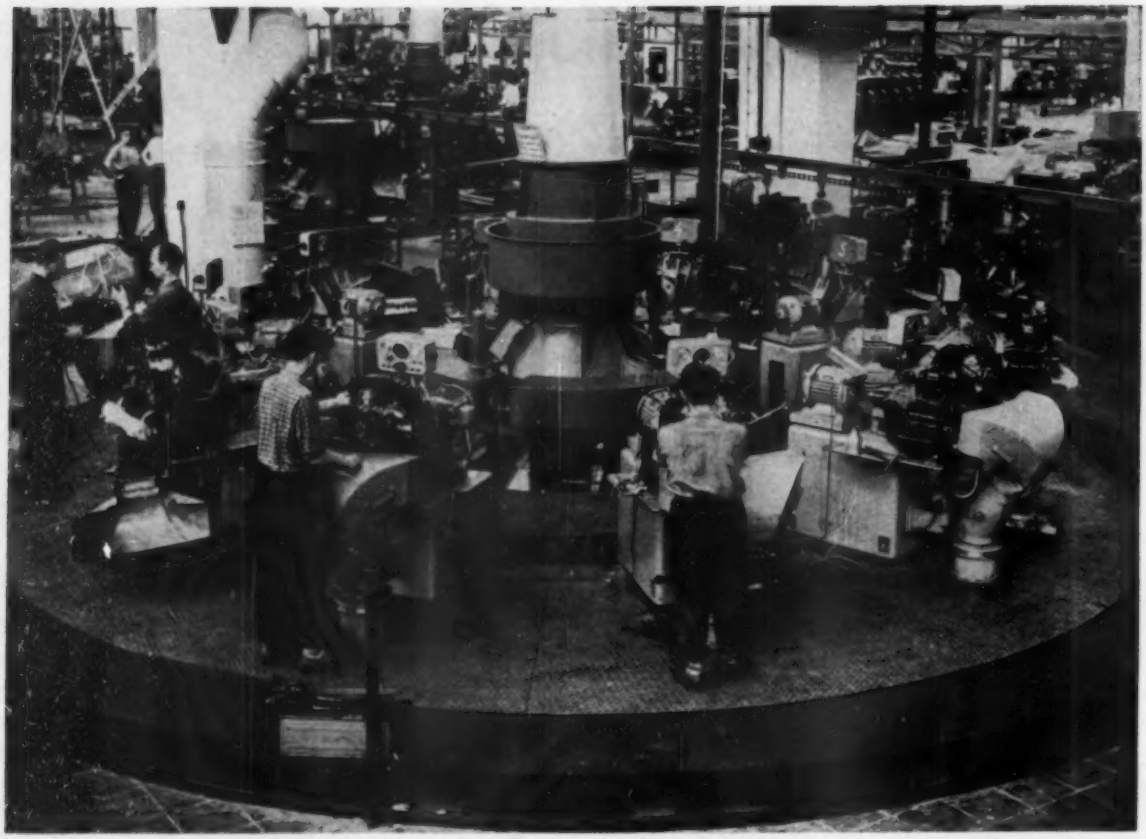
However, as the nails drop, they fall into the field of the large electromagnet and are lined up between the poles. When all the nails are aligned, the polarity of the magnet is reversed momentarily to demagnetize them. Then they drop in a tight, neat pack into the carton instead of tumbling in in all directions. Notice the volume reduction illustrated in Fig. 4.

The magnet core is made of three main parts: two yokes and a base. The base is flame-cut from 7-inch plate. The yokes are flame-cut from 12-in. plate, and all surfaces are machined.

Magnet yokes are welded

Then two 1½ x 2½ x 12¼-inch bars are welded to each yoke for support. It's not unusual for parts like the yokes to be cast, but a cost check showed a 67% saving in favor of welded design for these parts.

Three automated nail-processing units are already in operation, and another three for a large nail manufacturer will have a combined capacity of 200,000 pounds of nails per eight-hour shift. The estimated reduction in direct labor cost to package a ton of nails is 63%. Moreover, these same principles could readily be applied to packaging any similar, magnetizable parts. •



Final inspection and run-in of engines is performed on eight turntables like this. Engines are flushed out, filled with oil, run for 2½ min on propane gas while they are checked and adjusted, then drained

Volkswagen uses one-fifth of the world production of magnesium:

When magnesium and

Magnesium crankcase half is discussed by the author with VW production engineer at new engine plant in Hanover

By Anderson Ashburn,
managing editor

Biggest changes introduced when Volkswagenwerk put a new engine in its car last fall were in manufacturing. They include:

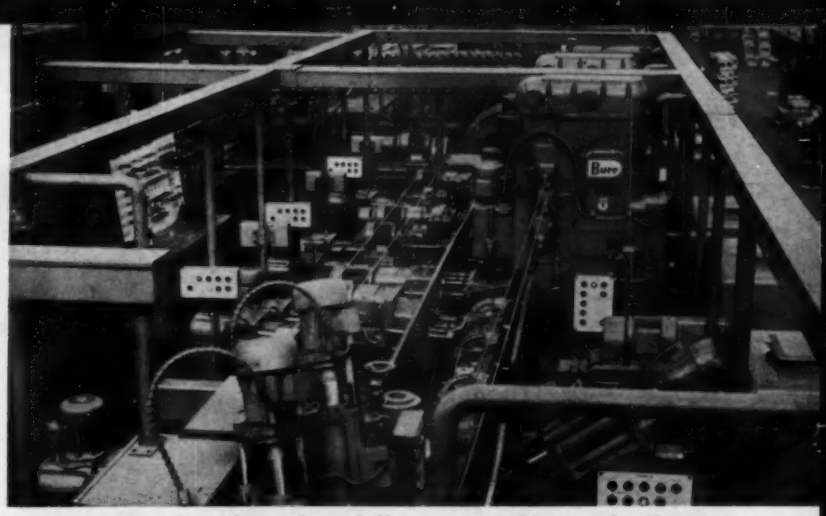
- Magnesium crankcases are now die-cast instead of being made by permanent-mold process.
- Cast-iron cylinders are cast in shell molds on continuous lines.
- Crankcases are machined on transfer lines, the first developed for magnesium, that include assembly of left and right castings.
- Assembled and balanced engines are checked and run-in on one of eight turntable inspection lines.

Volkswagen's new engine has increased horsepower (up from 34 to 40) but is essentially the same design as the original engine: a magnesium crankcase cast in two pieces with four individual cast-iron cylinders mounted, horizontally opposed, on the crankcase, and two aluminum cylinder heads, one for each pair of cylinders.

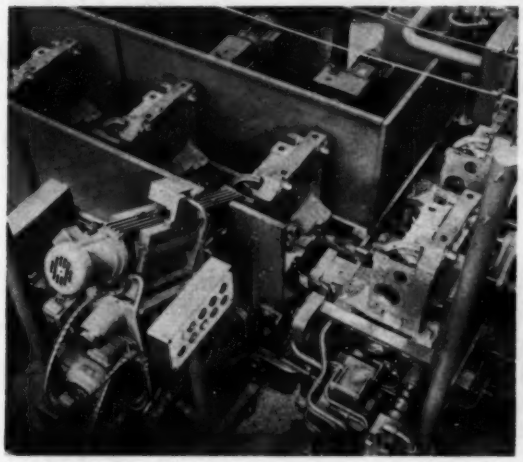
A new plant was built to produce the new engine and entirely new production methods and equipment were installed. (Machines used for the old engine are now devoted to spare-parts production.)

At the same time the foundry in

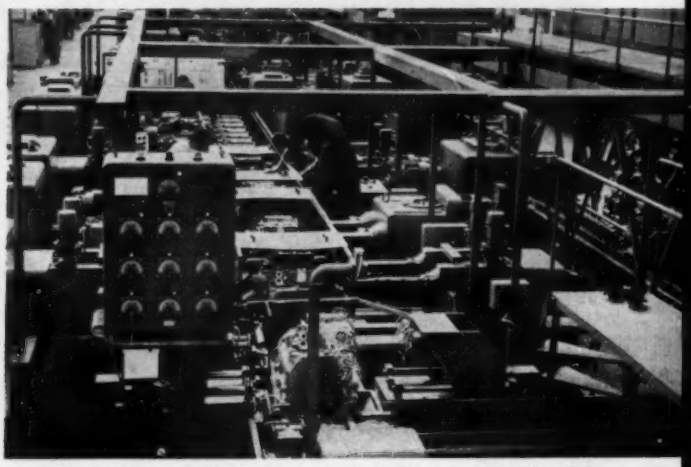
Mating face is first milled in special turntable machine with inserted-tooth cutter, shown with guard removed



Transfer machine for right crankcase half operates on 24-sec cycle. This picture shows only part of machine with housing for air-jet cleaning beyond cutting stations. Lines above machine are emergency stop for air supply



L-shaped transfer machines start with transverse section like this for operations on ends of crankcase



Crankshaft and camshaft bores are made in this machine after left and right halves have been assembled in automatic line

mass production meet

Wolfsburg was modernized. The present production rate is 4000 engines a day, but this should be up to 5000 per day within the next year.

Foundry operation

All engine castings, as well as the magnesium transmission housing, zinc hardware, and other parts are produced at the foundry on a three-shift basis with 350 men working on each shift.

The foundry uses 1800 tons of magnesium, 1300 tons of aluminum, and 1600 tons of iron per month. The crankcase is cast in two pieces (called left and right halves). It was made as a permanent-mold casting originally, but for the new engine is being die-cast in 1000-ton Lester-Weingarten machines.

Cast-iron cylinders are produced in shell molds on a production line supplied by a battery of machines to turn out the molds. This production line is in continuous motion with positioning of the molds, filling with sand, packing, pouring, cooling, and shakeout all taking place while the molds are traveling. An underfloor conveyor returns the sand from the end of the line to the filling station.

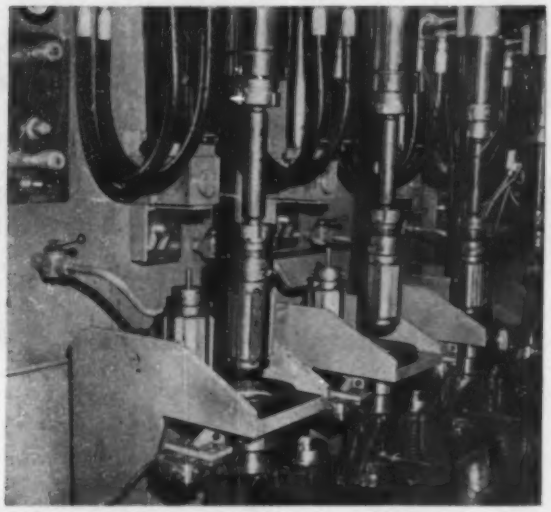
Adapting to magnesium

In adapting the operations on the crankcase to transfer lines, most of the adjustments were required because of the high coefficient of thermal expansion. If the work is heated too much in machining, the finished part will not be to size.

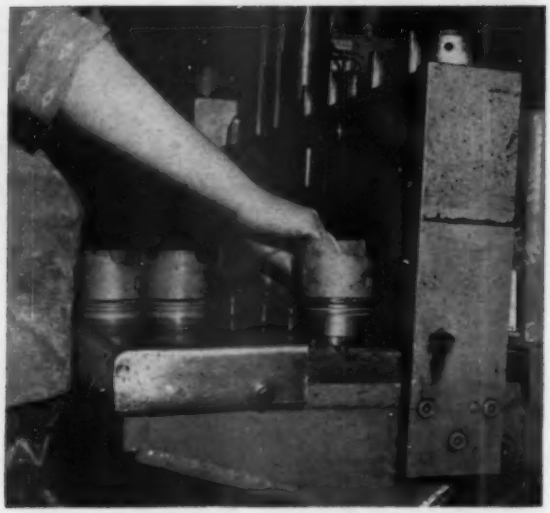
Thus where 0.040 in. has to be removed, it is necessary to take two cuts of 0.020 in. each a few stations apart so the work can cool between cuts.

There is little evidence that the plant that consumes about one-fifth of the annual world production of magnesium worries very much about the fire hazard that keeps so many U S plants from making extensive use of the metal.

Boxes of cast-iron chips are placed along the machining lines and if fine magnesium turnings start to burn a



Cast-iron cylinder bores are honed to a tolerance of 5 to 9 microns (0.0002 to 0.000,36 in.) after rough milling and finish boring operations



Piston-rings are assembled to pistons on this VW-designed machine that expands rings and pushes them into place when pistons are placed on them

handful of cast-iron chips is used to smother the blaze. A large "fire" may require a shovelful of chips. Minor outbreaks such as these are common, but there has never been a serious fire.

One reason may be that castings are coated with a non-flammable oil before machining. This oil on the chips as they are formed evidently inhibits the spread of a fire.

The fire hazard in machining magnesium only exists when fine cuts are made producing very fine chips. There is no problem with the large castings—which wind up as housings for an internal-combustion engine and give no trouble there.

First step in machining the castings is to mill the mating surfaces on two continuous turntable machines. Parts (quite light despite their size) are clamped to the turntable, which rotates them past a face mill with inserted carbide teeth.

L-shaped transfer lines

The next operation is to drill and ream two dowel holes so the part can be located on the fixtures of the transfer lines. Each line has a rectangular travel of the fixtures with machining stations located along two sides.

The short transverse section of the machine is for operations on the ends of the block, then operations on left and right sides are performed as the block moves the length of the line. This arrangement eliminates the need for turntables to rotate the fixtures.

The clamping method in the fixtures is described as "electromechanical" and can be regulated to avoid distortion.

The fixtures move on rails and are advanced from station to station by hydraulic pushrods, except that on the return line they are pulled along by a chain.

Air jets are placed at idle stations to blow chips out of the holes. After the last machining station the fixture moves through a blower cabin with automatic doors where compressed air jets thoroughly clean the housing.

Because the air jets could increase the seriousness of a fire, an emergency cord runs the length of the transfer machines along each side. Pulling this cord shuts off the entire compressed air system.

Two essentially similar transfer lines machine the right and left crankcase housings. They are then conveyed through an automatic washer and right and left halves are assembled in the next transfer line.

The left crankcase is loaded into a carrier and the studs, sorted and loaded by vibratory feeders, are inserted. The studs are screwed in by overhead spindles with pre-set torque clutches.

An operator then places the right crankcase over the studs and starts the nuts by hand. At the next station the nuts are drawn down to the proper torque.

The assembled crankcase then goes to the next transfer line where crankshaft and camshaft holes are bored and mounting flanges common to the two halves are machined. Following a blower station, the bores are checked at a gaging station using air gages.

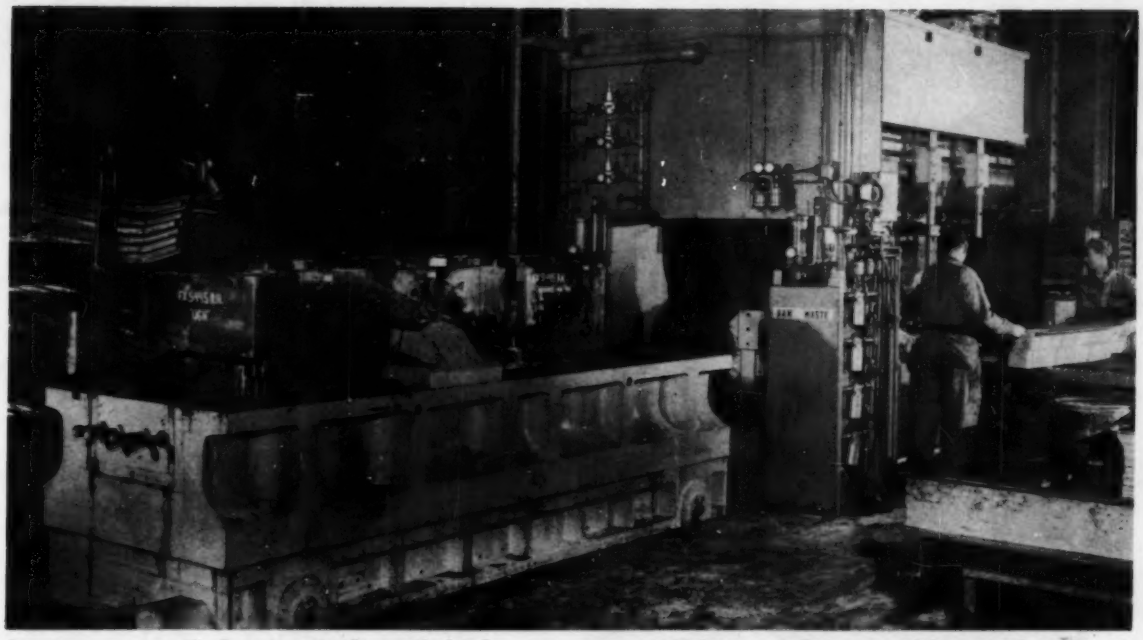
Taken apart again

The assembled crankcase goes from this transfer machine to a dismounting machine where the nuts are removed and the halves are separated. This is necessary both for additional machining operations on the inside of the housing and for the assembly of crankshaft, connecting rods, camshaft, and other internal parts before the engines halves are reassembled on the final line. The two halves machined together are kept together and eventually go into the same engine.

Chips blown from the work drop on screw conveyors that push them to openings through which they drop to the floor below and fall into chip trucks.

Throughout this entire operation there seems to be a very casual air about the volume of magnesium machining that is being performed. Any early difficulties in handling the material are obviously far behind now.

Housekeeping was of a high order in all the VW plants this writer saw, but it was no better on the magnesium lines than elsewhere in the plants. There was obviously a lot less concern about the fire hazard than one usually encounters. Apparently, it is viewed as a standard problem to be coped with like acid in plating baths. •



As press operates with die set mounted on right-hand movable bolster, idle left-hand bolster is outside press frame for easy interchange of dies, or modification of a die set. Hydraulic motors move bolster carts in and out of press

Forming auto frames at A O Smith

Sliding bolster cuts die change time

By N B Granberg
Chief manufacturing engineer
Automotive Division
A O Smith Corp
Milwaukee

Frequent interchange or modification of dies for forming a variety of automotive frame components has long been a time-consuming job—involving taking a press out of production every time a die is changed.

Faced with such frequent die changes in the manufacture of a variety of crossbars, reinforcements and side rails, A O Smith equipped a press with two power-interchanged sliding bolsters which have cut press downtime for die changes and modifications in half.

For a number of years, the company produced frame members up to 12-feet long on 1200-ton-capacity presses of conventional design. Because of the size of the frame members, large dies were and are required, and presses for draw-forming the members must have 54 x 150-inch beds. The presses operate at 12 strokes per minute.

Comparative press downtime

	Conventional press	Dual-bolster press
Number of die setups per week	5	6
Number of modifications per week	4	4
Hours required per die setup	2.0	1.0
Hours required per modification	1.0	0.5
Press time available for production	45%	68%

NOTE: Based on the above figures, in a 50-week year the dual-bolster press will have 400 more hours available for production than a similar press of conventional design. These press availability averages do not take into account delays due to press or tool breakdowns, or to press shutdowns while waiting for inspection, quality adjustments, delivery of stock, etc, all of which are common to all presses

Formerly, a press had to be taken out of production each time a die change was scheduled, or when die parts had to be interchanged to produce a necessary variation in the frame member.

The average die change, a two months' study showed, required two hours, and a modification one hour—so that each conventional press was available for production only about 45% of the time.

To overcome this situation, Smith engineers equipped a 1250-ton-capacity, top drive, 22-inch-stroke press with the sliding bolsters. This press, which averages six die changes and four modifications a week, is available for production 68% of the time — because it turns out parts from one die set while another die set is being installed on the idle bolster, which is moved outside the press frame. •

GIANT saw cuts GIANT scrap

By Irving Epstein, plant engineer
Panama Machinery Co, Seattle, Wash

Cost of flame-cutting huge (14 to 30 ton) manganese bronze ship propellers can be so prohibitive as to take all the profit out of the operation. Here's how one company put ingenuity to work and solved the problem of putting the scrapping job on a profitable basis

Breaking up ship propellers for scrap is no easy job, especially when they're of manganese bronze and weigh anywhere from 14 to 30 tons. True, the job can be done with an acetylene torch and iron powder, but the cost is so high it takes all the profit out of the job.

Faced with need for finding a cheaper way to do the job, Seattle's Panama Machinery Co first surveyed the work itself, found that some propellers were 20 ft in dia, with a hub 55 in. high and 44 in. in dia.

Obviously the solution was the same as Alexander the Great's for the Gordian knot—cut it. Manganese bronze saws nicely, admittedly, but the real problem was to find a saw that would span 55 inches in one cut. The only possible answer: build it.

Here's how it was done: the saw frame was constructed of standard structural members. Fifteen feet high, it is set in a concrete pit three feet deep, which comes within a foot of the railroad tracks in the yard.

Later, the work would be mounted on a wheeled carriage running on the tracks, and lateral movement would be obtained by incorporating a winch in the saw frame to provide fore-and-aft movement on ways in the bottom of the pit.

The carriage frame is made of 10-inch H beams, 7 feet square, and is floored with 2½-inch oak planks. The frame is mounted on 16-inch cast steel wheels, which have 6-inch axles and run in double-row Timken roller bearings. The frame thus supports 100 tons and rolls freely.

Feeding the work

Next problem: how to feed the saw? This involves moving a 22-ton workpiece steadily into the saw blade—no easy job, especially if the work is mounted on roller bearings and tends to drag itself in. If this should happen, the teeth would be knocked off the blade and the blade would break.

To avoid this, Panama Machinery built a variable feed calibrator consisting of a gearmotor coupled to a gearbox which turns a calibrated eccentric that works like a ratchet. The ratchet turns a leadscrew with a pitch of 4 tpi.

One end of the leadscrew is set into a universal nut mounted on the carriage, pulling the carriage into the saw at a positive rate of feed. At the lowest setting, feed is 1 inch per hour; top feed is 6 inches per hour. The leadscrew can be rotated by a hand crank to withdraw the work after the cut.

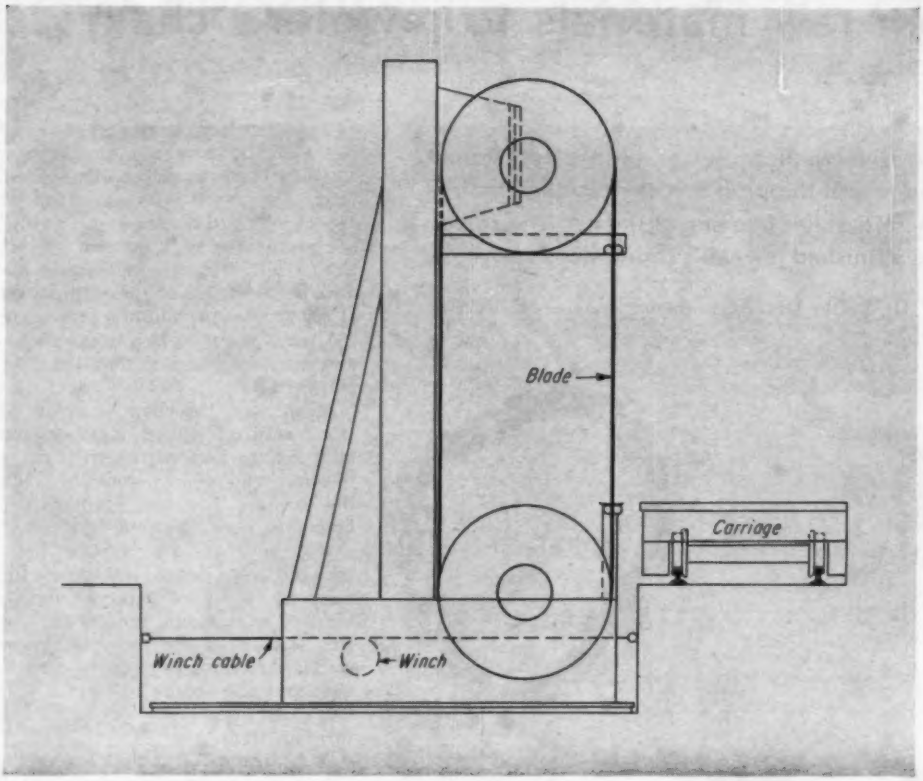
The saw blade is 1½ inches wide, 0.070 inch set, positive rake, has two teeth per inch. It costs $16, is good for several propellers.

The main drive is by a gearmotor that has an output speed of 11 rpm, further reduced by a roller chain and sprockets to 9 rpm, giving a cutting speed of 120 sfpm.

The opposite end of the motor shaft turns at 1200 rpm, driving a rotary air compressor to blow away the metal dust and cool the blade. The upper saw wheel adjusts up and down (for changing and tightening the blade) and may be tilted sideways to make the blade track properly on the wheel and run true in the guides.

Making the cuts

With the carriage withdrawn from the saw, a propeller is hoisted aboard and set at about the center of the carriage. Then the carriage is advanced until the leadscrew can be engaged with the feed nut. The



Schematic layout of giant bandsaw shows installation in pit and relation to railroad tracks. Built-in winch moves entire frame along ways

calibrator is set in motion and the first blade is fed into the saw.

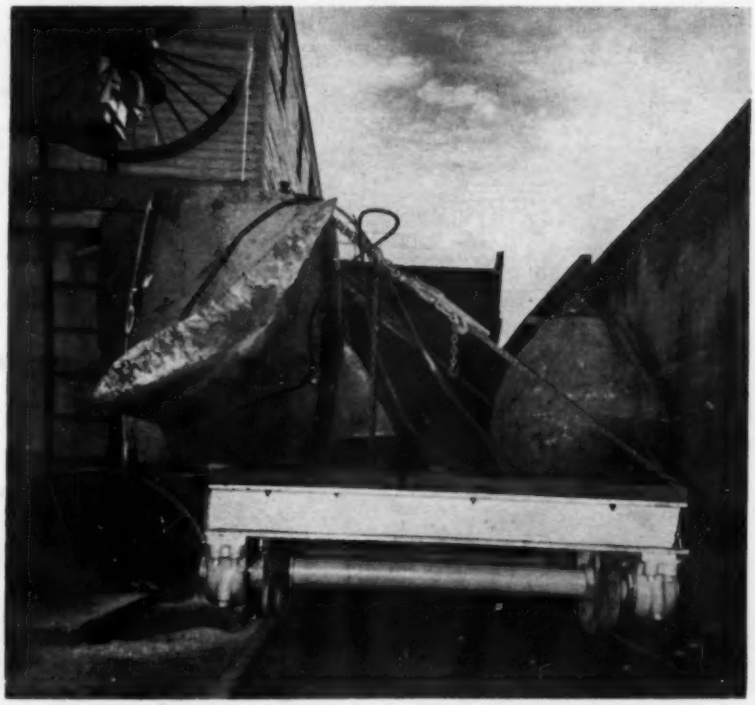
At the end of the first cut, the propeller is rotated to position the next blade, and the cut is repeated. If the blades are long, the saw is winched away from the tracks and 53-inch sections are cut off. This is repeated until only the hub remains. No holddowns are needed, because the weight of the work keeps it from moving.

Slitting the hub

The hub is cut into three sections, each cut made by shifting the hub to the edge of the carriage, where it overhangs far enough to permit the saw to clear.

Chain binders prevent the work from tipping, and a 7-ton cracker ball on the opposite edge acts as a counterbalance. Cuts go to within ¾ to 1 inch of the bore, to keep the hub from falling apart on the saw. Final separation is made after unloading by hitting it with a cracker ball.

With this method, costs have been reduced sharply. A 14-ton propeller, for example, can now be cut up at a cost of $2.80 for electric power, and $4 for blade wear. •



For sawing the hub, work overhangs carriage and is counterbalanced by 7-ton cracker ball on opposite side. Chains stop work from tipping

From raw materials to jeweler's chain . . .

Here is a progressive die that pierces, blanks and forms. Nothing unusual about that, but this one also *assembles*. Strip stock from rolls enters one end of the die, and comes out the other as a finished jeweler's chain. Here's how . . .

By Pablo Dryere, consulting engineer Mexico City

A continuous chain of stone settings forms the basis for many jewelry items. It is ready as it comes from the die to receive stones between four open prongs of each setting. Chain is so small that it has 198 links per yard

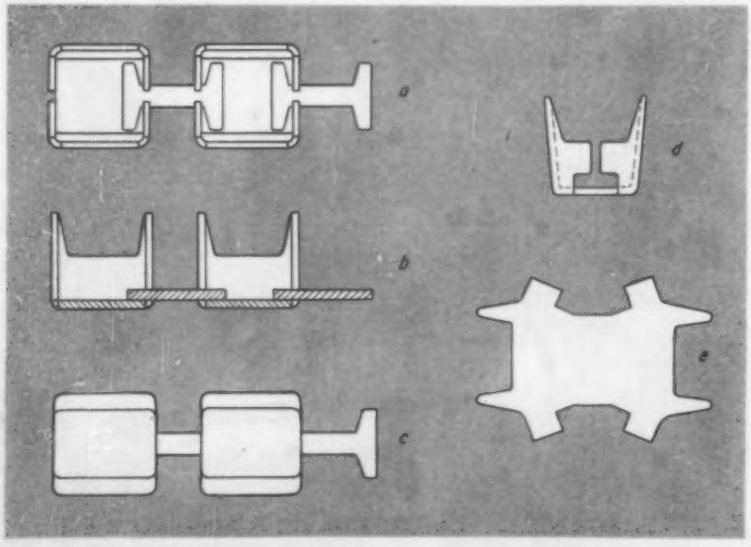


Fig. 1. Sketches a, b, and c are respectively top, side, and bottom views of the assembled chin. Slanted sides of a setting are shown at d, and e is a blank

Can you ask more of a progressive die than for it to pierce, blank, and form the work? Is it too much to expect it also to assemble parts while operating at a high rate of speed? Not at all. A newly developed die now performs all of these functions at 300 strokes per minute, producing 700 yards of jeweler's chain a day—and there are no fewer than 198 links per yard.

Essentially, the chain is a row of stone settings linked together and later cut to desired lengths by the jeweler, who mounts stones between the prongs. The end products are bracelets, necklaces, and diadems.

The settings are square four-pronged cups, each linked to the next by a figure I-piece that is blanked at the same time as the setting is blanked and formed. Unlike standard forming procedures, (which need but one stroke to form a part this small) this method requires two forming steps:

- An initial bend that leaves the end tabs open enough to permit entry of the link.
- A final bend which closes the setting over the link—after which the assembly is ejected through a chute out the front of the die.

Blanking sequence

Automatically fed from a large roll, the stock enters right side of the die. A locating hole is then pierced in the center of the strip. This hole is first picked up by a pilot in the second station and again in the last station to insure accurate alignment.

While in the second station, the front edge of the strip is nicked by a punch to establish one end of the link. Two stations further across, the sides of the link are blanked—leaving it attached only by its back (inside) end. The link is later completely sheared off in the assembly section of the die, which is four stations away.

Blanking the setting itself is done in the sixth station, which is provided with an ejector that returns the blank to the material strip for a "cut-and-carry" arrangement. From here, the blank is carried to the assembly section, two stations away, where it is pushed out of the strip by the forming punch.

HOW PROGRESSIVE CAN A DIE GET?

Fig. 2. Photo of strip material illustrates the various stages of the blanking process. At station 1, a pilot hole is pierced; at 2, one end of link is shaped; at 4, both sides of link are blanked; then the setting is blanked and returned at station 6; and finally at station 8, the blank is pushed down and the link is cut off

Forming and assembly

This punch, which has its own shedder, bends up the two ends of the blank as it travels down into and past the assembly level of the die. On the return of the forming punch, the shedder holds the part against a rising ejector, which brings it back up to assembly level.

Here, a slide feed pushes the part past a check finger, which holds it in position to receive a link. The slide is activated by a cam, closely fitted between rollers, to advance the work on the upstroke of the press. The emergence of a second piece places the first one in position for the second bend and lockup. This is accomplished with a die which comes up from below as it is activated by a rocker and striking-pin setup.

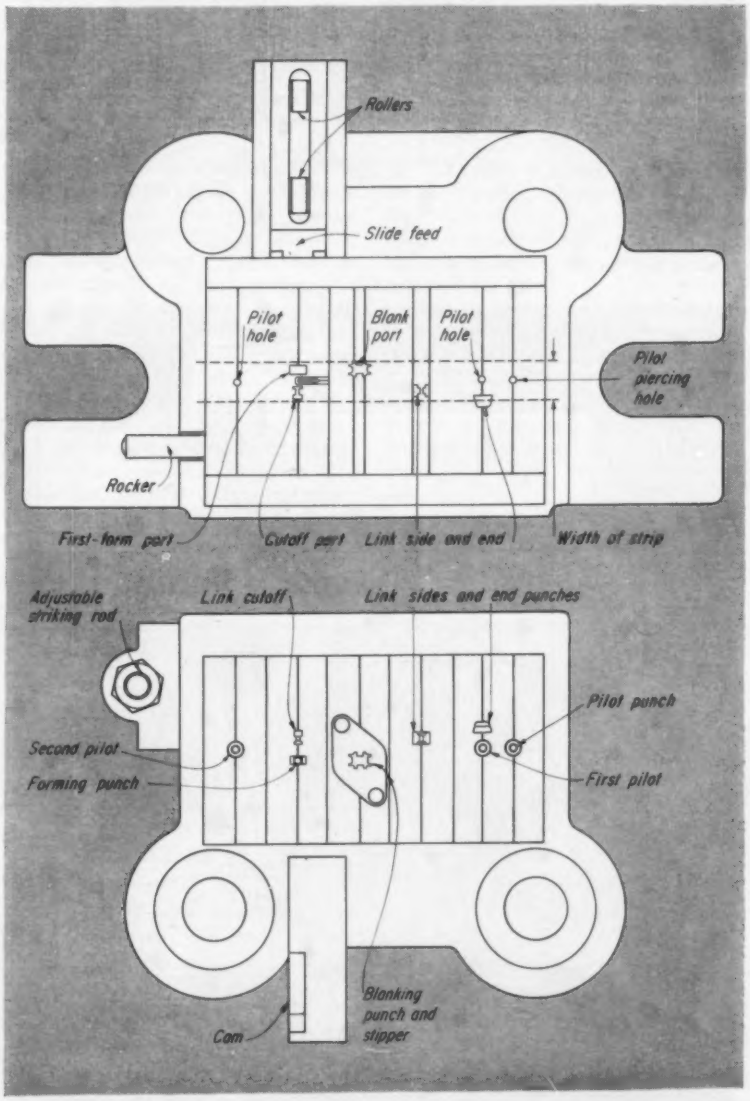
Chain details

Details of the chain are shown in Fig. 1. From top to bottom: (a) Top view shows links locked in the settings as sides are brought up in the final operation, (b) cross section of settings and links—plenty of room is allowed between the two parts for flexibility, (c) view of underside and (d) end view—note that sides are slightly slanted in final lockup, and (e) blank from which setting is formed.

Built-up die

The die itself (Figs. 3, 4, 5) is not a solid block, but rather is built up of sections to facilitate contouring the die openings and constructing the assembly-die position. The broken lines across the die indicate the width and path of the strip material (stripper is omitted in drawing).

To avoid crowding, the link is completed (except for the cutoff) before the setting is blanked. However, in



Figs. 3 (above) and 4 (below). Contouring and punch mounting are greatly simplified by sectional construction. Punch half of the die (**Fig. 4**) points out the outboard locations of the slide-feed cam and the adjustable striking rod

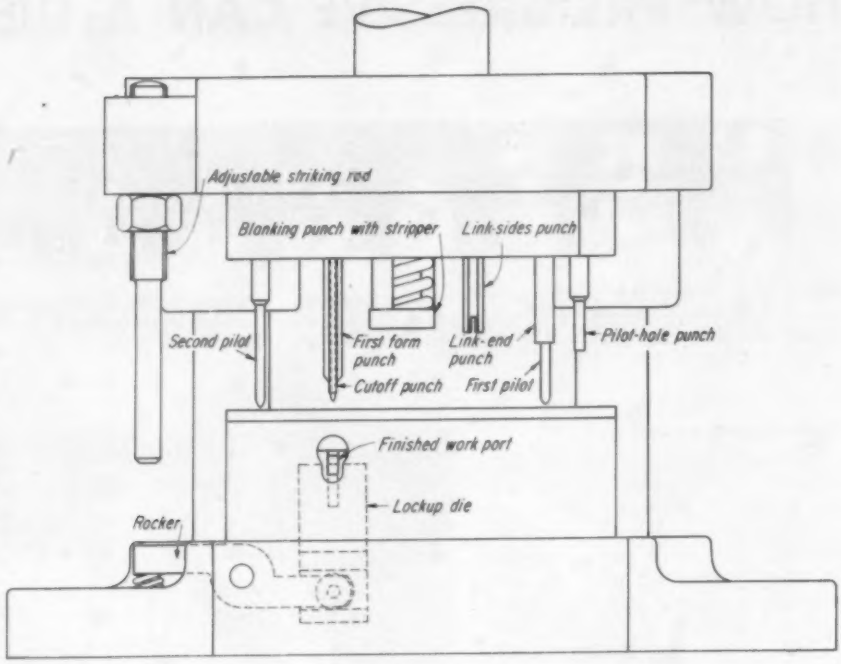


Fig. 5. Front elevation of assembled die locates punches, pilots, and adjustable striking rod. Cam operating the lockup die is omited so the form and cutoff punches can be clearly seen

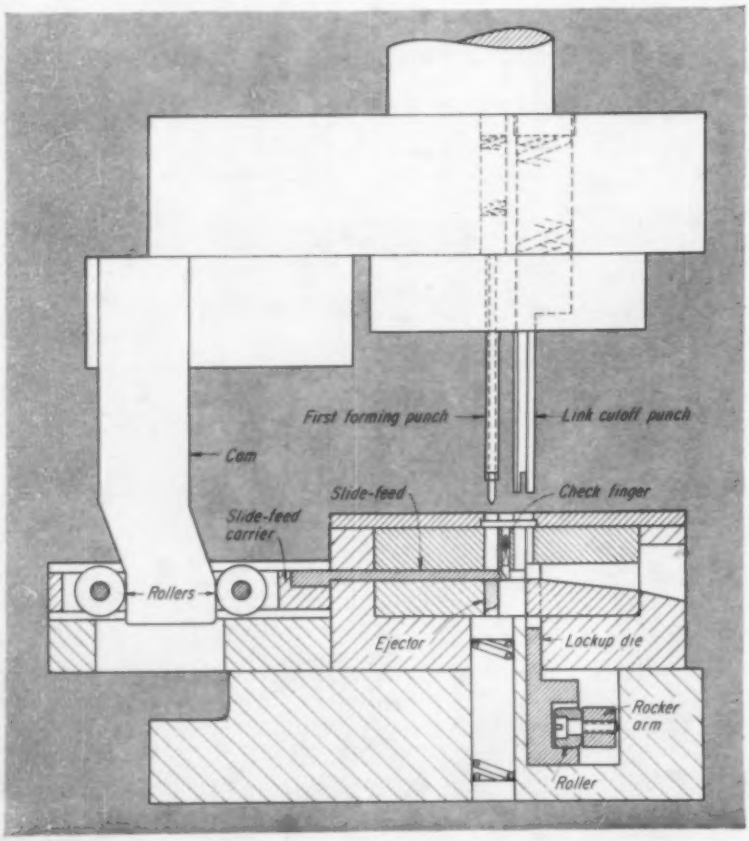


Fig. 6. Section through the assembly section. Die in open position sends slide feed forward through cam fitted between rollers in the slide-feed carrier

the final stage, the two blanks are positioned so closely together that forming and assembling can be performed with a minimum of difficulty. The precise axis of both is aligned at 90° to the stock feed.

Operating in a square port (between the forming and link-cutoff ports in the assembly section) is the check finger, which is kept in constant contact with the work on the lower level by a piano-wire spring recessed in the die face. At no time does the spring rise above that face to interfere with the progress of the stock strip.

How the die assembles

Detail of the lower level, where assembly actually takes place, is shown by a cross-section in Fig. 6. With the die fully open, the cam (on the left, in the drawing) pushes the slide-feed carrier forward, under the check finger and into link-accepting position.

On the down stroke, the slide feed immediately backs off to rest behind the first-forming port and ejector. When the cycle is repeated, a second setting pushes the first into lockup position above the second-forming die.

This die (shown at lower right in the drawing) is activated by a roller affixed to the end of a rocker arm which pivots in a die-set cutout. The

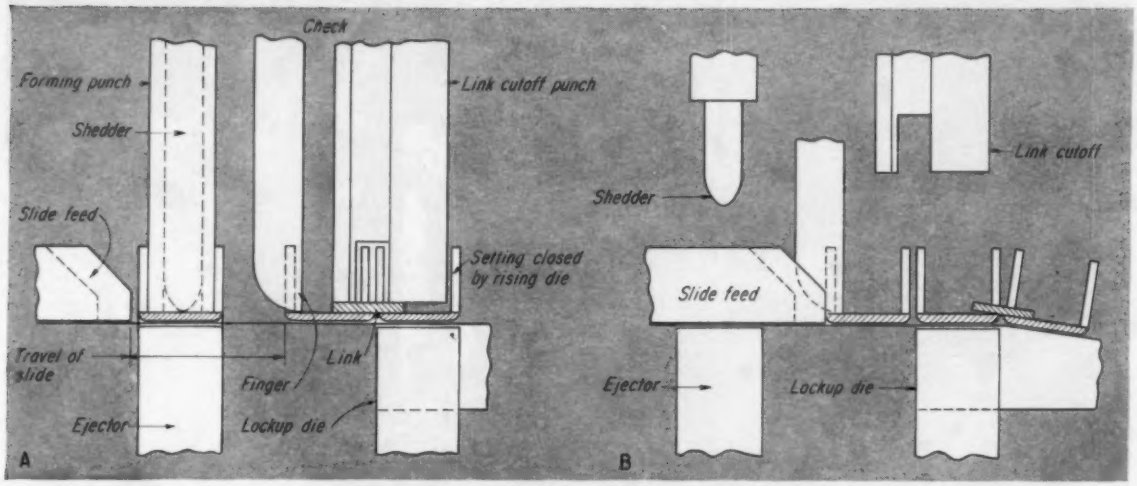


Fig. 7. Detail of one-two operation in the assembly section. In sketch A, setting at left has just returned to assembly level. Sketch B shows the same setting being pushed into link-receiving position

out-board end of the rocker arm is spring loaded. This keeps the forming die retracted until it is reversed by an adjustable striking rod mounted in the punch-half of the die set.

Note that the first form punch and link-cutoff punch, both shown in this drawing, are spring loaded. In each case, the tension control of the springs behind these punches is important; fine adjustment of both is provided by plugs backing them up in the die set. The tension behind the forming punch must be enough to overpower the ejector at the bottom of the forming die. And, as the cutoff punch also serves a holddown during assembly, its spring tension has to be great enough to sever the link but not so strong that it distorts the settings.

A close up of the most interesting section of the die (the assembly) is shown in Fig. 7. Here, the two steps that closely follow each other in forming and assembling are illustrated. At left, (A) the various positions of the punches, check finger, and workpieces are shown immediately after the first setting is locked up. The slide is withdrawn; the first forming punch is about to leave the setting; and the link-cutoff punch (which straddles the prongs of two settings to hold both ends of a link) releases its grip.

Thus, with the lock-up die again at rest and while the punches retract, the last blank to enter the assembly section is pushed into position to receive a link, as shown in sketch B, Fig. 7. It is by this action that the finished chain is ejected from the die through a chute at the left front end. •

Flexible "half mill" cuts setup, running times

As many as 300 parts are being straddle-milled in an hour at Cincinnati's Frank Brunet Co, a shop that performs a wide range of jobs on a variety of metals.

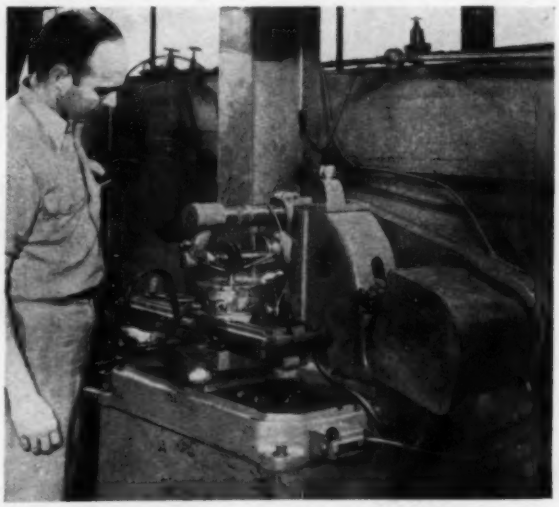
50% cut in setup time

The job is being done on a small, flexible U S (for U S Burke Machine Tool Co, Cincinnati) Half Mill, a rise-and-fall-miller equipped with air-holding fixtures. With it, Brunet has thus far milled steel, aluminum, brass and stainless with a 50% reduction in setup time, and a 25% reduction in running time.

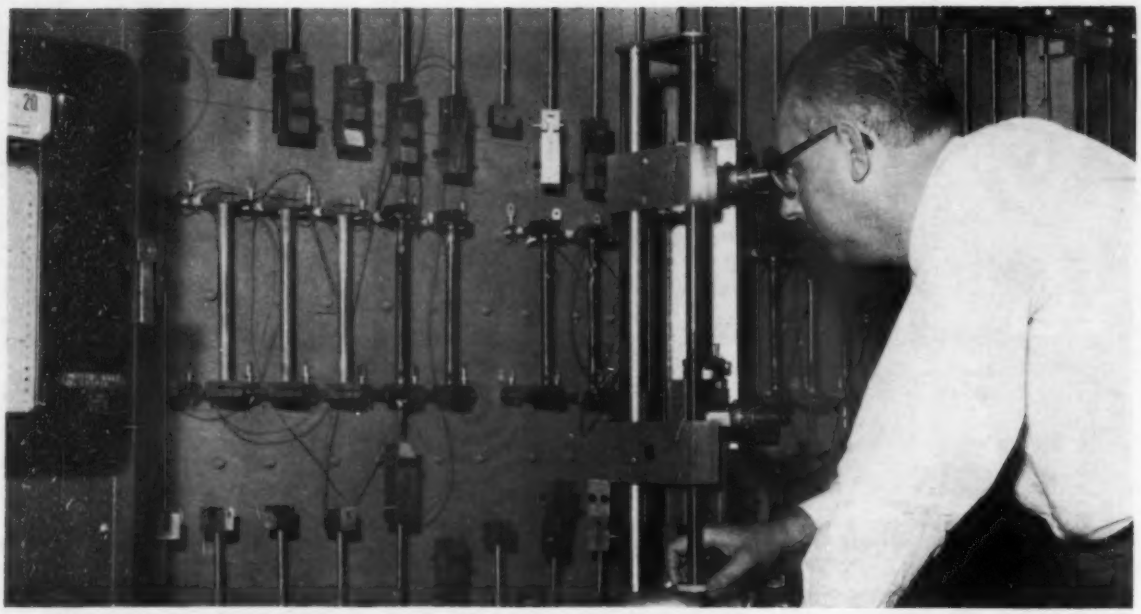
In the operation pictured at right, parts are inserted by hand and clamped by the air fixture. The two 4-in. diameter cutters are then hand fed through the work (spindle speed here is 940 rpm).

Brunet also does form milling, keywaying, sawing, face and slab milling on the machine, which has a vertical head feed of 4½ in. Horizontal longitudinal table travel is determined by the size of the optional length tables available.

The machine is also equipped for completely automatic single and duplex machining. Or it can be used simply as an independent head. Alternatively (for high production) it can be equipped with both head and table hydraulic feed. •



Parts are inserted by hand, clamped by air in this US Burke Half Mill, and cutters are hand fed through the work as spindle rotates at 940 rpm



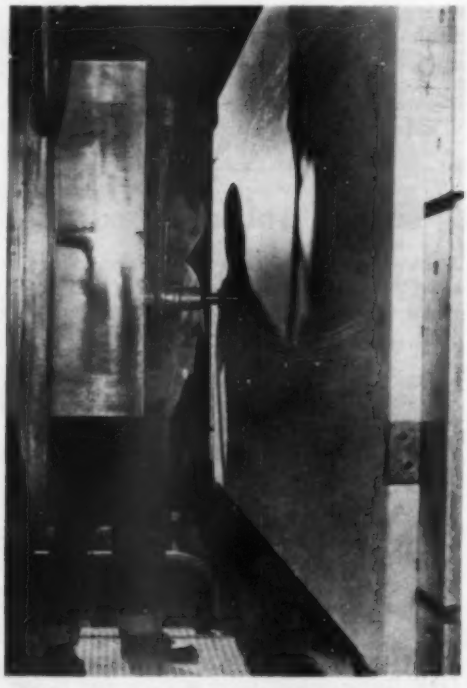
Automatic creep testing machine

As many as 36 different specimens can be tested simultaneously for elevated-temperature creep strength on Convair-San Diego's automatic "cycling creep machine." Machine can subject specimens to varying loads and can heat each specimen to several temperatures for predetermined periods. Automatic equipment may be bypassed for manual testing

SHOP SHOTS

Bore honing to within 0.000,020 in.

Bore honing machine developed by Barden Corp, Danbury, Conn, uses gimbaled workholder for inner ring to permit honing to within 0.000,020-inch tolerance and near-perfect roundness, yet maintain squareness of bore to ring. Finished precision bearing has 14 critical dimensions held within tolerances of 0.000,020 inch



Miller scribes templets

Tape-controlled Kearney & Trecker profile miller scribes master templet drawings for Boeing's 727 jet. Boeing says layout time is about the same as for manual layout, but that drawings are more accurate and that tape can be used again

Exhibiting machine tools and related equipment produced in the ten member countries of the European Committee for Cooperation of the Machine Tool Industries: Austria, Belgium, Denmark, France, Germany, Italy, Great Britain, Netherlands, Sweden, and Switzerland.

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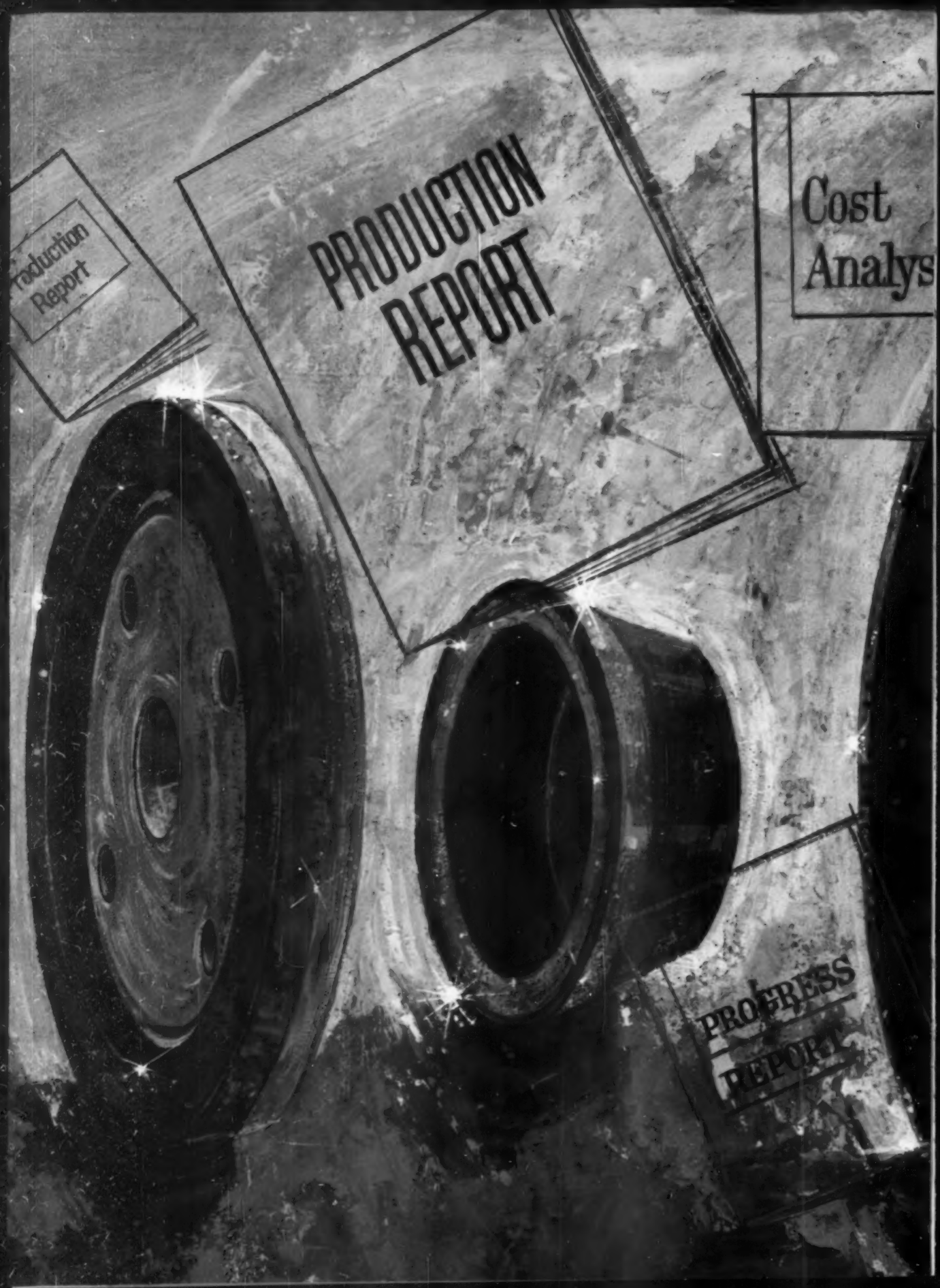
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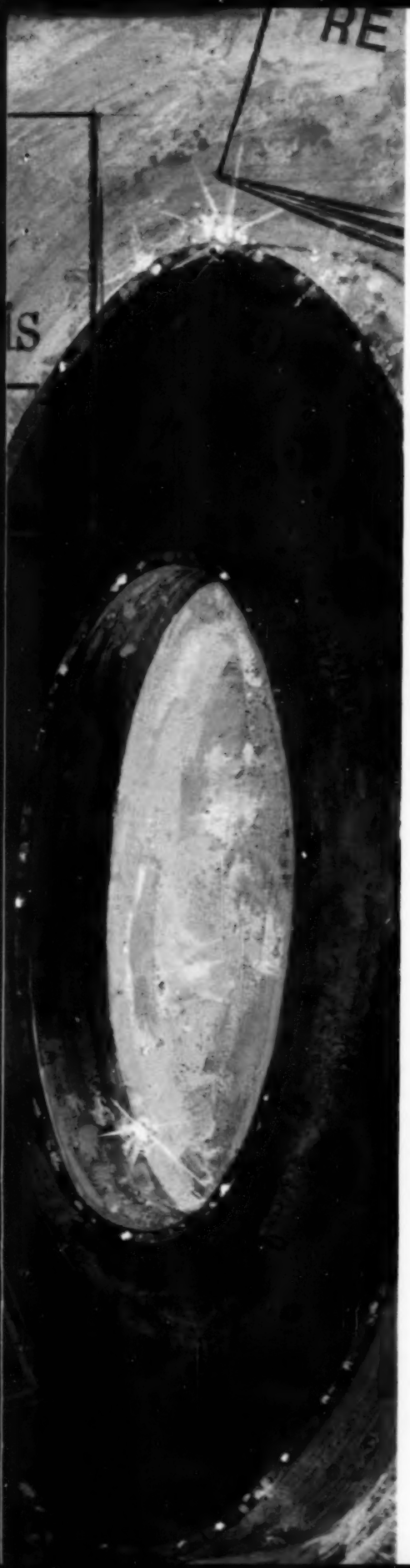

G-E Man-Made Diamond's contribution to industry

In the few brief years since its introduction, General Electric Man-Made diamond has made important contributions to industry. Specifically, grinding wheel users receive these benefits when they choose wheels containing G-E Man-Made diamond:

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Consistent performance is assured by the uniform shape and structure of General Electric Man-Made diamond crystals produced by controlled manufacturing processes.

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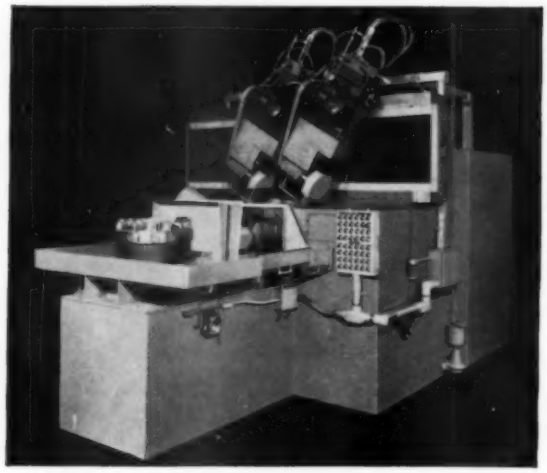
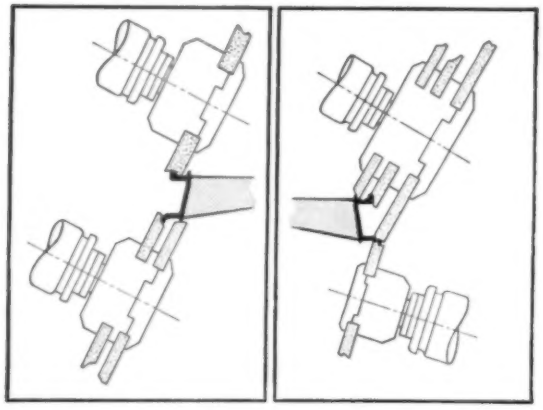


Vertical production grinder shown above is typical of Springfield four-head machines in jet engine plants. An upper and lower head are located at each station. Station operations are shown below.



Left station — 7 surfaces ground in one pass.

Right station — 12 surfaces ground in one pass.

When high production and accuracy dictate your grinding requirements, it will pay you to investigate the Springfield principle of vertical grinding. The pay-off is also in floor space savings and in the fact that heads usually can be repositioned when part requirements change.

If you would like to know more about the vertical grinding principle, please send for our Bulletin 197-C. The Springfield Machine Tool Company, Springfield, O.

SPRINGFIELD

◀ CIRCLE 296 READER SERVICE CARD

CIRCLE 297 READER SERVICE CARD ▲

Limits for Plated Threads—I

By Robert D'Agostino, staff engineer, Central Development Engrg Dept., Loral Electronics Corp., New York

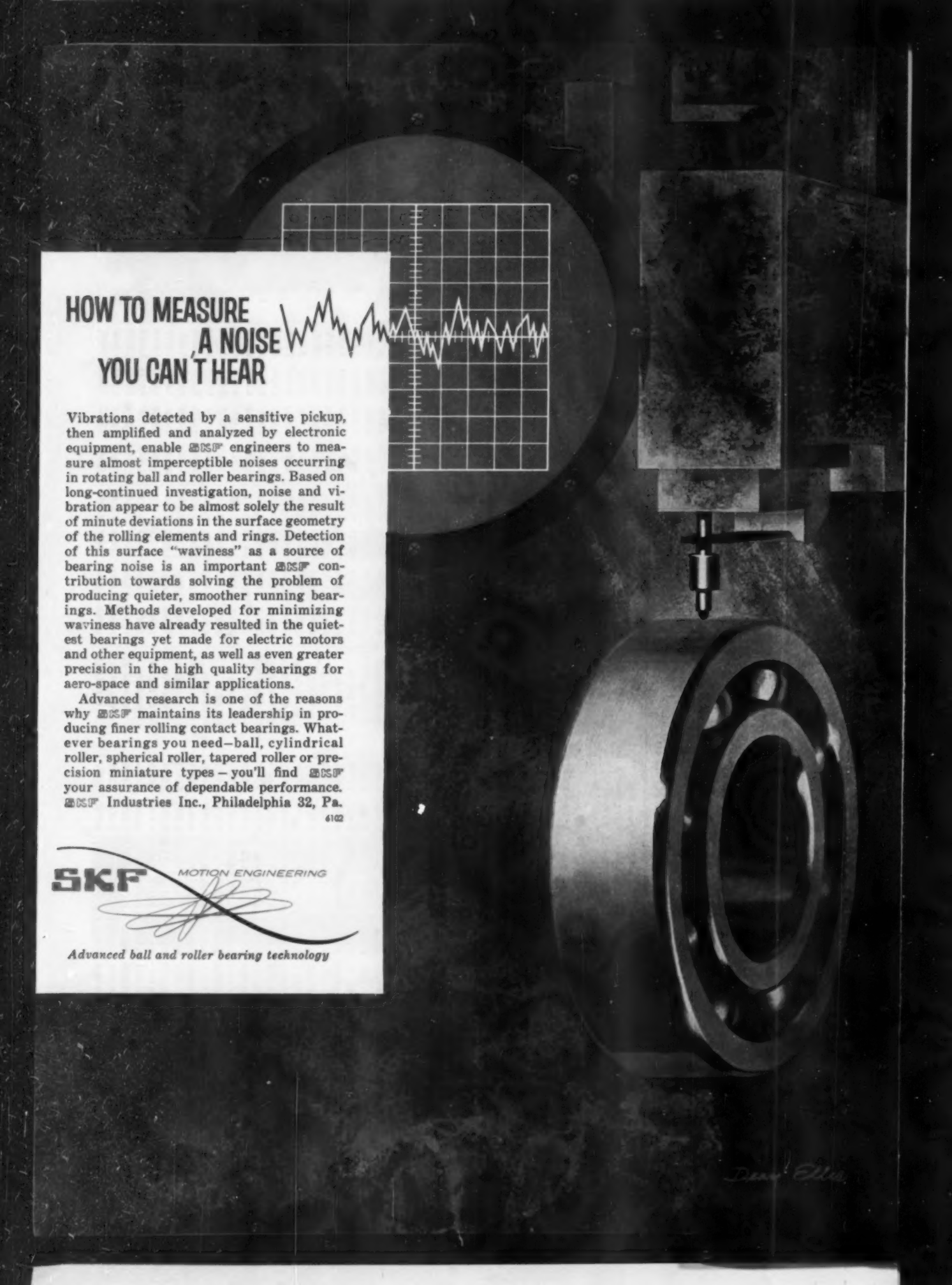
To deposit a predetermined amount of plating on a threaded part, it is essential to control the pitch diameter and quality of these parts *prior* to plating. The reason for this is the fact that the plating thickness affects the pitch diameter by a 4:1 ratio.

An earlier article "Thread Limits Before Plating" (*AM*—July 13, 1959, p137) gives gage settings plus or minus before plating. The tables on this page and p83 give the actual limits of the thread at the pitch diameter both before and after plating for two thicknesses of deposit. These limits can be used to order gages, setup the machine, and inspect the product.

Plating Deposit 0.0003-0.0005 In.

No. Th'ds Size & Class	External Th'd Pitch Dia Before Plating (specify on dwg) Max	Min	After Plating (inspect to) Max	Min	Internal Th'd Pitch Dia Before Plating (specify on dwg) Min	Max	After Plating (inspect to) Min	Max
	Class 2A				Class 2B			
0-80-UNF-2A	0.0499	0.0489	0.0519	0.0501	0.0539	0.0554	0.0519	0.0542
1-64-UNC-2A	0.0609	0.0597	0.0629	0.0609	0.0649	0.0667	0.0629	0.0655
1-72-UNF-2A	0.0620	0.0609	0.0640	0.0621	0.0660	0.0677	0.0640	0.0665
2-56-UNC-2A	0.0724	0.0711	0.0744	0.0723	0.0764	0.0784	0.0744	0.0772
2-64-UNF-2A	0.0739	0.0727	0.0759	0.0739	0.0779	0.0798	0.0759	0.0786
3-48-UNC-2A	0.0835	0.0820	0.0855	0.0832	0.0875	0.0897	0.0855	0.0885
3-56-UNF-2A	0.0854	0.0840	0.0874	0.0852	0.0894	0.0914	0.0874	0.0902
4-40-UNC-2A	0.0938	0.0921	0.0958	0.0933	0.0978	0.1003	0.0958	0.0991
4-48-UNF-2A	0.0965	0.0949	0.0985	0.0961	0.1005	0.1028	0.0985	0.1016
5-40-UNC-2A	0.1068	0.1050	0.1088	0.1062	0.1108	0.1133	0.1088	0.1121
5-44-UNF-2A	0.1082	0.1065	0.1102	0.1077	0.1122	0.1146	0.1102	0.1134
6-32-UNC-2A	0.1157	0.1137	0.1177	0.1149	0.1197	0.1226	0.1177	0.1214
6-40-UNF-2A	0.1198	0.1180	0.1218	0.1192	0.1238	0.1264	0.1218	0.1252
8-32-UNC-2A	0.1417	0.1396	0.1437	0.1408	0.1457	0.1487	0.1437	0.1475
8-36-UNF-2A	0.1440	0.1420	0.1460	0.1432	0.1480	0.1508	0.1460	0.1496
10-24-UNC-2A	0.1609	0.1584	0.1629	0.1596	0.1649	0.1684	0.1629	0.1672
10-32-UNF-2A	0.1677	0.1655	0.1697	0.1667	0.1717	0.1748	0.1697	0.1736
12-24-UNC-2A	0.1869	0.1843	0.1889	0.1855	0.1909	0.1945	0.1889	0.1933
12-28-UNF-2A	0.1908	0.1884	0.1928	0.1896	0.1948	0.1982	0.1928	0.1970
12-32-NEF-2A	0.1937	0.1914	0.1957	0.1926	0.1977	0.2010	0.1957	0.1998
1/4-20-UNC-2A	0.2155	0.2126	0.2175	0.2138	0.2195	0.2235	0.2175	0.2223
1/4-28-UNF-2A	0.2248	0.2223	0.2268	0.2235	0.2288	0.2323	0.2268	0.2311
1/4-32-NEF-2A	0.2277	0.2253	0.2297	0.2265	0.2317	0.2351	0.2297	0.2339
5/16-18-UNC-2A	0.2744	0.2712	0.2764	0.2724	0.2784	0.2829	0.2764	0.2817
5/16-24-UNF-2A	0.2834	0.2805	0.2854	0.2817	0.2874	0.2914	0.2854	0.2902
5/16-32-NEF-2A	0.2902	0.2878	0.2922	0.2890	0.2942	0.2976	0.2922	0.2964
3/8-16-UNC-2A	0.3324	0.3288	0.3344	0.3300	0.3364	0.3413	0.3344	0.3401
3/8-24-UNF-2A	0.3459	0.3429	0.3479	0.3441	0.3499	0.3540	0.3479	0.3528
3/8-32-NEF-2A	0.3527	0.3501	0.3547	0.3513	0.3567	0.3603	0.3547	0.3591
7/16-14-UNC-2A	0.3891	0.3852	0.3911	0.3864	0.3931	0.3984	0.3911	0.3972
7/16-20-UNF-2A	0.4030	0.3996	0.4050	0.4008	0.4070	0.4116	0.4050	0.4104
7/16-28-UNEF-2A	0.4123	0.4095	0.4143	0.4107	0.4163	0.4201	0.4143	0.4189
1/2-12-N-2A	0.4439	0.4393	0.4459	0.4405	0.4479	0.4541	0.4459	0.4529
1/2-13-UNC-2A	0.4480	0.4438	0.4500	0.4450	0.4520	0.4577	0.4500	0.4565
1/2-20-UNF-2A	0.4655	0.4620	0.4675	0.4632	0.4695	0.4743	0.4675	0.4731
1/2-28-UNEF-2A	0.4748	0.4719	0.4768	0.4731	0.4788	0.4828	0.4768	0.4816

No. Th'ds Size & Class	External Th'd Pitch Dia Before Plating (specify on dwg) Max	Min	After Plating (inspect to) Max	Min	Internal Th'd Pitch Dia Before Plating (specify on dwg) Min	Max	After Plating (inspect to) Min	Max
	Class 2A				Class 2B			
9/16-12-UNC-2A	0.5064	0.5020	0.5084	0.5032	0.5104	0.5164	0.5084	0.5152
9/16-18-UNF-2A	0.5244	0.5207	0.5264	0.5219	0.5284	0.5335	0.5264	0.5323
9/16-24-NEF-2A	0.5334	0.5303	0.5354	0.5315	0.5374	0.5417	0.5354	0.5405
5/8-11-UNC-2A	0.5640	0.5593	0.5660	0.5605	0.5680	0.5744	0.5660	0.5732
5/8-12-N-2A	0.5689	0.5643	0.5709	0.5655	0.5729	0.5792	0.5709	0.5780
5/8-18-UNF-2A	0.5869	0.5830	0.5889	0.5842	0.5909	0.5961	0.5889	0.5949
5/8-24-NEF-2A	0.5959	0.5927	0.5979	0.5939	0.5999	0.6043	0.5979	0.6031
11/16-12-N-2A	0.6314	0.6268	0.6334	0.6280	0.6354	0.6417	0.6334	0.6405
11/16-24-NEF-2A	0.6584	0.6552	0.6604	0.6564	0.6624	0.6668	0.6604	0.6656
3/4-10-UNC-2A	0.6830	0.6779	0.6850	0.6791	0.6870	0.6939	0.6850	0.6927
3/4-12-N-2A	0.6939	0.6892	0.6959	0.6904	0.6970	0.7043	0.6959	0.7031
3/4-16-UNF-2A	0.7074	0.7032	0.7094	0.7044	0.7114	0.7171	0.7094	0.7159
3/4-20-UNEF-2A	0.7155	0.7119	0.7175	0.7131	0.7195	0.7244	0.7175	0.7232
13/16-N-2A	0.7564	0.7517	0.7584	0.7529	0.7604	0.7668	0.7584	0.7656
13/16-16-UN-2A	0.7699	0.7658	0.7719	0.7670	0.7739	0.7794	0.7719	0.7782
13/16-20-UNEF-2A	0.7780	0.7744	0.7800	0.7756	0.7820	0.7869	0.7800	0.7857
7/8-9-UNC-2A	0.8006	0.7953	0.8028	0.7965	0.8048	0.8122	0.8028	0.8110
7/8-12-N-2A	0.8189	0.8142	0.8209	0.8154	0.8229	0.8293	0.8209	0.8281
7/8-14-UNF-2A	0.8266	0.8220	0.8286	0.8232	0.8306	0.8368	0.8286	0.8356
7/8-16-UN-2A	0.8324	0.8283	0.8344	0.8295	0.8364	0.8419	0.8344	0.8407
7/8-20-UNEF-2A	0.8405	0.8369	0.8425	0.8381	0.8445	0.8494	0.8425	0.8482
15/16-12-UN-2A	0.8814	0.8765	0.8834	0.8777	0.8854	0.8920	0.8834	0.8908
15/16-16-UN-2A	0.8949	0.8907	0.8969	0.8919	0.8989	0.9046	0.8969	0.9034
15-16-20-UNEF-2A	0.9030	0.8993	0.9050	0.9005	0.9070	0.9121	0.9050	0.9109
1-8-UNC-2A	0.9168	0.9108	0.9188	0.9120	0.9208	0.9288	0.9188	0.9276
1-12-UNF-2A	0.9439	0.9388	0.9459	0.9400	0.9479	0.9547	0.9459	0.9535
1-16-UN-2A	0.9574	0.9532	0.9594	0.9544	0.9614	0.9671	0.9594	0.9659
1-20-UNEF-2A	0.9655	0.9618	0.9675	0.9630	0.9695	0.9746	0.9675	0.9734
1-1/16-12-UN-2A	1.0064	1.0015	1.0084	1.0027	1.0104	1.0170	1.0084	1.0158
1-1/16-16-UN-2A	1.0199	1.0157	1.0219	1.0169	1.0239	1.0296	1.0219	1.0284
1-1/16-18-NEF-2A	1.0244	1.0205	1.0264	1.0217	1.0284	1.0338	1.0264	1.0326
1-1/8-7-UNC-2A	1.0302	1.0238	1.0322	1.0250	1.0342	1.0428	1.0322	1.0416
1-1/8-8-N-2A	1.0418	1.0357	1.0438	1.0369	1.0458	1.0540	1.0438	1.0528
1-1/8-12-UNF-2A	1.0689	1.0637	1.0709	1.0649	1.0729	1.0799	1.0709	1.0787
1-1/8-16-UN-2A	1.0824	1.0782	1.0844	1.0794	1.0864	1.0921	1.0844	1.0909
1-1/8-18-NEF-2A	1.0869	1.0830	1.0889	1.0842	1.0909	1.0963	1.0889	1.0951



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Vibrations detected by a sensitive pickup, then amplified and analyzed by electronic equipment, enable SKF engineers to measure almost imperceptible noises occurring in rotating ball and roller bearings. Based on long-continued investigation, noise and vibration appear to be almost solely the result of minute deviations in the surface geometry of the rolling elements and rings. Detection of this surface "waviness" as a source of bearing noise is an important SKF contribution towards solving the problem of producing quieter, smoother running bearings. Methods developed for minimizing waviness have already resulted in the quietest bearings yet made for electric motors and other equipment, as well as even greater precision in the high quality bearings for aero-space and similar applications.

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SKF MOTION ENGINEERING

Advanced ball and roller bearing technology

Limits for Plated Threads—II

Note that maximum pitch diameter of the plated external thread exceeds the standard dimension for uncoated threads by an amount equal to the allowance. This practice is consistent with a recommendation on p 23, Handbook H 28-1957, or Screw Thread Standards for Federal Services." Thus, line-to-line contact with the female thread can occur at the pitch diameter Such practice minimizes corrosion between threaded members, overcomes lead-error problems, and the softer plating may be compressed to provide a snug, gage-like fit.

Plating Deposit = 0.0005-0.0007 In.

No. Th'ds Size & Class	External Th'd Pitch Dia Before Plating (specify on dwg) Max	Min	After Plating (inspect to) Max	Min	Internal Th'd Pitch Dia Before Plating (specify on dwg) Min	Max	After Plating (inspect to) Min	Max
	Class 2A				Class 2B			
0-80-UNF-2A	0.0491	0.0481	0.0519	0.0501	0.0547	0.0562	0.0519	0.0542
1-64-UNC-2A	0.0601	0.0589	0.0629	0.0609	0.0657	0.0675	0.0629	0.0655
1-72-UNF-2A	0.0612	0.0601	0.0640	0.0621	0.0668	0.0685	0.0640	0.0665
2-56-UNC-2A	0.0716	0.0703	0.0744	0.0723	0.0772	0.0792	0.0744	0.0772
2-64-UNF-2A	0.0731	0.0719	0.0759	0.0739	0.0787	0.0806	0.0759	0.0786
3-48-UNC-2A	0.0827	0.0812	0.0855	0.0832	0.0883	0.0905	0.0855	0.0885
3-56-UNF-2A	0.0846	0.0832	0.0874	0.0852	0.0902	0.0922	0.0874	0.0902
4-40-UNC-2A	0.0930	0.0913	0.0958	0.0933	0.0986	0.1011	0.0958	0.0991
4-48-UNF-2A	0.0957	0.0941	0.0985	0.0961	0.1013	0.1036	0.0985	0.1016
5-40-UNC-2A	0.1060	0.1042	0.1088	0.1062	0.1116	0.1141	0.1088	0.1121
5-44-UNF-2A	0.1074	0.1057	0.1102	0.1077	0.1130	0.1154	0.1102	0.1133
6-32-UNC-2A	0.1149	0.1129	0.1177	0.1149	0.1205	0.1234	0.1177	0.1214
6-40-UNF-2A	0.1190	0.1172	0.1218	0.1192	0.1246	0.1272	0.1218	0.1252
8-32-UNC-2A	0.1409	0.1388	0.1437	0.1408	0.1465	0.1495	0.1437	0.1475
8-36-UNF-2A	0.1432	0.1412	0.1460	0.1432	0.1488	0.1516	0.1460	0.1496
10-24-UNC-2A	0.1601	0.1576	0.1629	0.1596	0.1657	0.1692	0.1629	0.1672
10-32-UNF-2A	0.1669	0.1647	0.1697	0.1667	0.1725	0.1756	0.1697	0.1736
12-24-UNC-2A	0.1861	0.1835	0.1889	0.1855	0.1917	0.1953	0.1889	0.1933
12-28-UNF-2A	0.1900	0.1876	0.1928	0.1896	0.1956	0.1990	0.1928	0.1970
12-32-NEF-2A	0.1921	0.1906	0.1957	0.1926	0.1985	0.2018	0.1957	0.1998
1/4-20-UNC	0.2147	0.2118	0.2175	0.2138	0.2203	0.2243	0.2175	0.2223
1/4-28-UNF-2A	0.2240	0.2215	0.2268	0.2235	0.2296	0.2331	0.2268	0.2311
1/4-32-NEF-2A	0.2269	0.2245	0.2297	0.2265	0.2325	0.2359	0.2297	0.2339
5/16-18-UNC-2A	0.2736	0.2704	0.2764	0.2724	0.2792	0.2837	0.2764	0.2817
5/16-24 UNF-2A	0.2826	0.2797	0.2854	0.2817	0.2882	0.2922	0.2854	0.2902
5/16-32-NEF-2A	0.2894	0.2870	0.2922	0.2898	0.2950	0.2984	0.2922	0.2964
3/8-16-UNC-2A	0.3316	0.3280	0.3344	0.3300	0.3372	0.3421	0.3344	0.3401
3/8-24-UNF-2A	0.3451	0.3421	0.3479	0.3441	0.3507	0.3548	0.3479	0.3528
3/8-32-NEF-2A	0.3519	0.3493	0.3547	0.3513	0.3575	0.3611	0.3547	0.3591
7/16-14-UNC-2A	0.3883	0.3844	0.3911	0.3864	0.3939	0.3992	0.3911	0.3972
7/16-20-UNF-2A	0.4022	0.3988	0.4050	0.4006	0.4078	0.4124	0.4050	0.4104
7/16-28-UNEF-2A	0.4115	0.4087	0.4143	0.4107	0.4171	0.4209	0.4143	0.4189
1/2-12-N	0.4431	0.4385	0.4459	0.4405	0.4487	0.4549	0.4459	0.4529
1/2-13-UNC	0.4472	0.4430	0.4500	0.4450	0.4528	0.4585	0.4500	0.4565
1/2-20-UNF-2A	0.4647	0.4612	0.4675	0.4632	0.4703	0.4751	0.4675	0.4731
1/2-28-UNEF-2A	0.4740	0.4711	0.4768	0.4731	0.4759	0.4836	0.4768	0.4816

No. Th'ds Size & Class	External Th'd Pitch Dia Before Plating (specify on dwg) Max	Min	After Plating (inspect to) Max	Min	Internal Th'd Pitch Dia Before Plating (specify on dwg) Min	Max	After Plating (inspect to) Min	Max
	Class 2A				Class 2B			
9/16-12-UNC-2A	0.5056	0.5012	0.5084	0.5032	0.5112	0.5172	0.5084	0.5152
9/16-18-UNF-2A	0.5596	0.5559	0.5624	0.5579	0.5652	0.5343	0.5624	0.5323
5/8-11-UNC-2A	0.5632	0.5585	0.5660	0.5605	0.5688	0.5752	0.5660	0.5732
5/8-12-N-2A	0.5681	0.5635	0.5709	0.5655	0.5737	0.5800	0.5709	0.5780
5/8-18-UNF-2A	0.5861	0.5822	0.5889	0.5842	0.5917	0.5969	0.5889	0.5949
5/8-24-NEF-2A	0.5951	0.5919	0.5979	0.5939	0.6007	0.6051	0.5979	0.6031
11/16-12 N-2A	0.6306	0.6260	0.6334	0.6280	0.6362	0.6425	0.6334	0.6405
11/16-24 NEF-2A	0.6576	0.6544	0.6604	0.6564	0.6632	0.6676	0.6604	0.6656
3/4-10 UNC-2A	0.6822	0.6771	0.6850	0.6791	0.6878	0.6947	0.6850	0.6927
3/4-12 N-2A	0.6931	0.6884	0.6959	0.6904	0.6987	0.7051	0.6959	0.7031
3/4-16 UNF-2A	0.7066	0.7024	0.7094	0.7044	0.7122	0.7179	0.7094	0.7159
3/4-20 UNEF-2A	0.7147	0.7111	0.7175	0.7131	0.7203	0.7252	0.7175	0.7232
13/16-12-N-2A	0.7556	0.7509	0.7584	0.7529	0.7612	0.7676	0.7584	0.7656
13/16-16-UN-2A	0.7691	0.7650	0.7719	0.7670	0.7747	0.7802	0.7719	0.7782
13/16-20 UNEF-2A	0.7772	0.7736	0.7800	0.7756	0.7828	0.7877	0.7800	0.7857
7/8-9 UNC-2A	0.8000	0.7945	0.8028	0.7965	0.8056	0.8130	0.8028	0.8110
7/8-12 N-2A	0.8181	0.8134	0.8209	0.8154	0.8237	0.8301	0.8209	0.8281
7/8-14 UNF-2A	0.8258	0.8212	0.8286	0.8232	0.8314	0.8376	0.8286	0.8356
7/8-16 UN-2A	0.8316	0.8275	0.8344	0.8295	0.8372	0.8427	0.8344	0.8407
7/8-20 UNEF-2A	0.8397	0.8361	0.8425	0.8381	0.8453	0.8502	0.8425	0.8482
15/16-12 UN-2A	0.8806	0.8757	0.8834	0.8777	0.8862	0.8928	0.8834	0.8908
15/16-16 UN-2A	0.8941	0.8899	0.8969	0.8919	0.8997	0.9054	0.8969	0.9034
15/16-20 UNEF-2A	0.9022	0.8985	0.9050	0.9005	0.9078	0.9129	0.9050	0.9109
1-8 UNC-2A	0.9150	0.9100	0.9188	0.9120	0.9216	0.9296	0.9188	0.9276
1-12 UNF-2A	0.9431	0.9380	0.9459	0.9400	0.9487	0.9555	0.9459	0.9535
1-16 UN-2A	0.9566	0.9524	0.9594	0.9544	0.9622	0.9679	0.9594	0.9659
1-20 UNEF-2A	0.9647	0.9610	0.9675	0.9630	0.9703	0.9754	0.9675	0.9734
1-1/16-12 UN	1.0056	1.0007	1.0084	1.0027	1.0112	1.0178	1.0084	1.0158
1-1/16-16 UN-2A	1.0191	1.0149	1.0219	1.0169	1.0247	1.0304	1.0219	1.0284
1-1/16-18 NEF-2A	1.0236	1.0197	1.0264	1.0217	1.0292	1.0346	1.0264	1.0326
1-1/8-7 UNC-2A	1.0294	1.0230	1.0322	1.0250	1.0350	1.0436	1.0322	1.0416
1-1/8-8 N-2A	1.0410	1.0349	1.0438	1.0369	1.0466	1.0548	1.0438	1.0528
1-1/8-12 UNF-2A	1.0681	1.0629	1.0709	1.0649	1.0737	1.0807	1.0709	1.0787
1-1/8-16 UN-2A	1.0816	1.0774	1.0844	1.0794	1.0872	1.0929	1.0844	1.0909
1-1/8-18-NEF-2A	1.0861	1.0822	1.0889	1.0842	1.0917	1.0971	1.0889	1.0951

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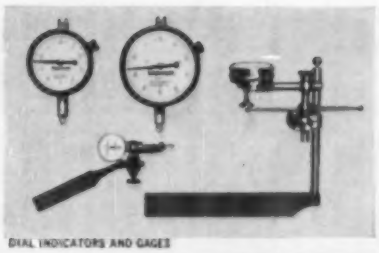

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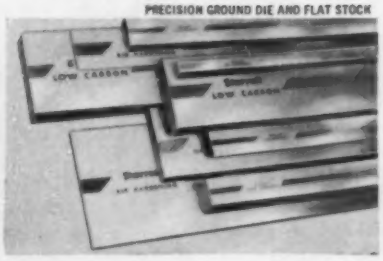

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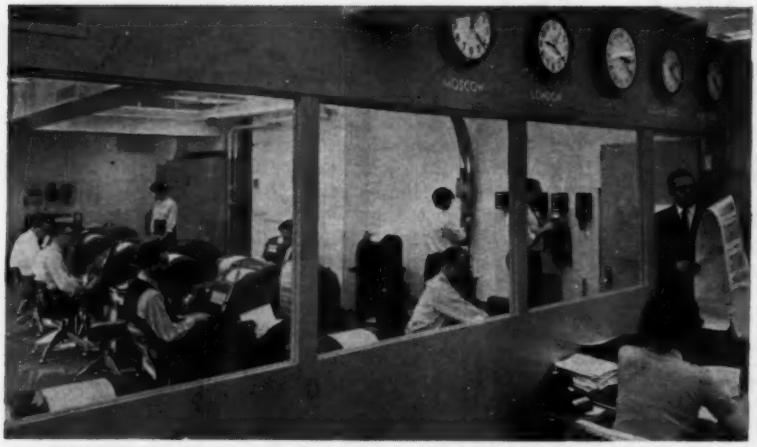
World's Greatest Toolmakers

Talking Shop



Lots of News

FORGIVE US if we point with pride to our new teletype room, shown above. This nerve center has seven teletype machines, ten cable machines, and two wire services: a total of 19 machines over which we get news—on 17 of them this news is coming directly from our own field editors (Ben Brosheer in Chicago, Chuck Emerson in Detroit, George DeGroat in Los Angeles) and from our many Bureau people.

We share this communications network with the other McGraw-Hill publications, of course, which makes a complete system practical.

We still use the mails, too, but we can get a story or check a point in a hurry with Chicago, or San Francisco, or London, or Paris, or many another bureau. And we love those clocks that are both dramatic and necessary in a communications network like this one.

Bogged Down

COMPLAINTS ARISE from time to time about the problems of keeping up with the mass of publications that are available. Successful production men know the value — indeed the compelling necessity—of reading to keep up to date. Most of them have also learned to be selective and efficient in their reading.

But there is always room for improvement and that is why we commend to your attention a short, clear statement of "Why, When and How to Read Business Publications." This pamphlet is the work of Fred Wittner, President of Fred Wittner, Inc. We think it does a fine job in a few words. If you would like a copy, circle Item 50 on the Reader's Service Card and we'll ask the author to send you a copy.

Efficiency

SPORTS PAGES seem an unlikely place to encounter machine tools. But Jack Price, who's first love was a jig borer, and whose present love is Carry Back, the horse that won the Kentucky Derby, has made it possible. Sports writers are understandably vague in reporting on metalworking matters but Price is quoted as describing that jig borer as "all gleaming chrome, paint, and efficiency. I loved it because it was good."

If Price had that jig borer trained the way Carry Back was for the Derby, there must have been some exciting afternoons in his machine shop in Cleveland.

Remember the Scalpel

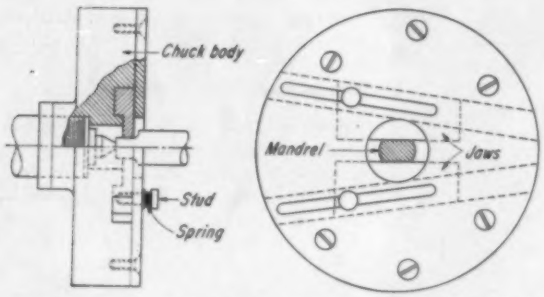
WE'VE COMMENTED before that panic cost cutting is costly and it is essential to make cuts with a scalpel instead of an axe. Across-the-board reductions almost always do as much harm as good. We cited the case of the company that contrived a 20% cut in maintenance costs but sent direct costs up more than the saving because of increased downtime.

That this is not a new problem was emphasized when we were browsing through the program for a theatre party sponsored by AMERICAN MACHINIST in 1912. George Merryweather found the program and loaned it to us. There is a lot of good satire and bad poetry in the program, of which this is a fair sample:

"Your last report," the expert said,
"Showed seven rivets shy.
Now how can we efficient be
If wastes like that get by?"
A month passed by—the expert smiled,
The new report was fine.
"Now here I see," he said in glee,
"You've found them all this time."
"All's there," said Pat, "but seems to me
'Taint economic ways,
I kept two men a hunting them
For over seven days."

Practical Ideas

Special Mandrel Chuck Eliminates Driver



Since adopting this chuck, down time between each work cycle has been reduced to the absolute minimum. No longer is it necessary to affix a driver to the mandrel, nor adjust or change its position from one end to the other after mounting the work. In its place, two easily applied jaws drive the mandrel on flats which form tangs on each end of all our mandrels.

Once the jaws have been set to drive a particular mandrel there is no need to further adjust them. The parallel opening remains the same while the mandrel is withdrawn for unloading and again when it's inserted after loading. Incidentally, where backlash is taboo, this chuck offers an added advantage; the jaws can be snugged up so tightly that reverse motion is completely eliminated.

The chuck body, which mounts on the lathe spindle like any chuck or face place, is machined from cast iron. Following the turning job, two grooves are milled into the body face at 8° on either side of the diagonal centerline. The section between the two grooves is then recessed to provide space for the jaws under a retaining plate that makes up the frontal face of the chuck.

Two jaws are made from flat-bar stock into trapezoidal shape; the angled sides being 8° to the opposite ones and machined to form keys on the back face. Both should have overall sliding fits—in the keyways and under the retaining plate. The necessary friction, to hold the jaws where set, is provided by springs compressed by studs. These are screwed into the jaws and operate in slots milled through the retaining plate.

L Kasper, Philadelphia, Pa

Height Gage Checks Squareness

Attach a dial indicator to the slide of a height gage and you have a setup that gives you a direct reading of squareness. This is particularly convenient when you have to correct a piece out of square because it shows how much and where correction have to be made. And, it's even of greater value when a square can't be applied because the surface to be checked is recessed.

The method is quite simple. Once the indicator has been mounted, after the height gage has been thoroughly cleaned and given a film of light oil, the slide is set to move freely without play. The gage is then checked out for squareness against the face of a master square. Chances are that the gage will be all right, but should deviations show up, they can easily be compensated for in the final analysis to get the actual reading.

However, should you balk at the thought of using your height gage this way, it would not be difficult to construct an accurate upright and slide for this purpose. A slide could even be made to fit the blade of your present 8 or 10-in. master square.

J C Magee, Schenectady, NY

Samples are Silent Salesman

When you enter our office, the first thing that strikes your eye is a display, in gleaming brass, of parts made by our dies. Not only are these parts decorative, but they are also impressive to a potential customer whose eyes have been known to wander in their direction during tool-construction negotiations. In this way, we have a silent salesman working for us.

The parts are made after a die has been completed and tested. We then select a piece of brass of proper thickness and buff it to a high finish. After running it through a die to either blank and/or form it, we lightly buff the finished product and give it a coat of clear plastic.

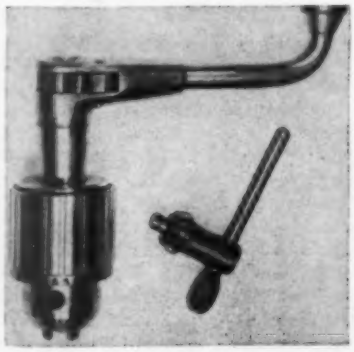
Gerald Millerwise, Sebewaing, Mich

Modified Bit Brace Holds Round Shanks

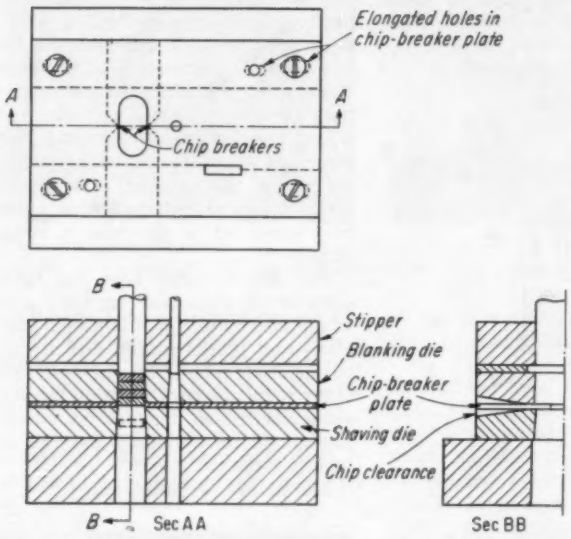
Combine a bit brace, preferably of the ratchet type, with a geared chuck and you have a handy tool for many around-the-shop jobs. As a holder for cutting tools, it is probably most often used for deburring but, in emergencies, you can also use it to countersink and spotface.

In addition to serving as a holder for other round-shank tools, the modified brace is a speed handle for assembly with socket-head capscrews. For this, hexagonal key wrench stock in assorted sizes, is cut and gripped in the chuck.

Ray Shoberg, Milwaukee, Wis



Blanking Die Shaves Parts' Edges in Single Operation



Shaved, finely finished, and perfectly sized parts emerge from the die illustrated at the same rate as if it were a plain blanking die.

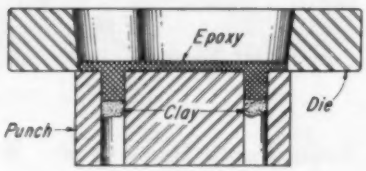
It is done by stacking a blanking die on top of a shaving die, sandwiching between them a pair of chip breakers. Thus, the die-block assembly appears the same as any other die block and is stock fed in the same manner.

The blanking die does, however, differ from standard ones in that, instead of having 1 or 2° slug-clearance taper, it has only 10 to 15'. This slight taper is designed to keep the slugs aligned, and yet provide enough clearance to allow them to pass through without jamming and undue resistance.

At the beginning of a run, blanks are normally produced and collected in the slug port. When the port is completely filled, the pressure of the punch forces the bottom blank through the shaving die. At the same time, the chip breakers split the waste so it can pass out on both sides of the die through chip clearance slots.

Alignment of the blank and shaving dies is insured by dowels through the whole assembly and into the die shoe. When the mounting holes are drilled and the dowel holes drilled and reamed, they are done with all parts assembled. Upon completion, the chip-breaker plates are removed and their holes elongated to provide for adjustment after subsequent grinding for resharpening.

A G, Budapest, Hungary



Templet is Molded Epoxy

A finished die block makes a perfect mold for casting a templet from which a punch is to be contoured. And, when the casting material is epoxy resin, you have a templet that is durable and one which can be anchored to the punch for the duration of the work process.

We have found this method far superior to our old way of following a line scribed on the punch face through the die opening. The only possible factor that could be a deterrent, would be the waiting time needed for the epoxy to set. But, if the work is properly planned, this should be no problem at all.

In using this method, the die opening is first completed as is customary with other systems. Dowel and mounting holes drilled through the punch are next fitted with clay plugs as shown in the sketch. Your best bet is now to mount die and punch on their respective die shoes to insure alignment when the punch is finished.

After coating the inside of the die opening with paste wax, invert the die on the punch and pour a mixture of epoxy resin on the punch face. The depth of the epoxy need not be more than ⅛ in. and at no time should it be thick enough to enter the slug-clearance angle. Once the epoxy has set, pull the die shoes apart and remove the punch with templet for final filing.

Kaleva F Lifter, Burnt Hills, NY

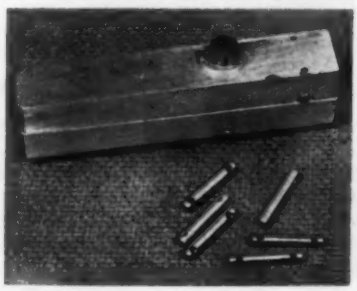
Quick and Dirty Jig For Pin Drilling

Simplicity is the keynote of this jig which accurately guides the drill in drilling two holes in small pins. To load the jig, all it takes is to place a pin between two bars and give a locking screw a twist. Loosening the screw lets the pin drop out.

Accuracy is attained by milling a V-groove across one of the bars and then drilling the two holes, at the required spacing, through the block in the exact bottom of the groove. Through the same bar, and close to the V-groove, goes a clearance hole for the clamping screw. The backup bar is drilled and tapped in a corresponding location to receive the screw.

The width of both bars are identical to the length of the pins to make centralizing the work easy. Thus, the thumb and forefinger, on either end of the pin, can be used to center it; or the jig can be laid on the side before tightening the screw.

J C Magee, Schenectady, NY



Practical Ideas

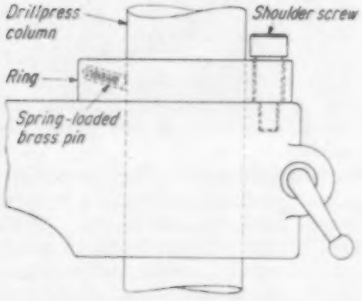
Check Ring Safeguards Drillpress Operator

During the process of operating a drillpress, it is necessary for the operator to lift, lower, or swing the table. Upon unlocking the clamp to make these adjustments the danger of the table dropping is always there, particularly if it is weighted down by a heavy vise or workpiece. When this happens, chances are great of getting a mashed finger or, if the piece falls to the floor, a broken toe.

Our insurance against such accidents comes in the form of a simple check ring which slips over the drillpress column and anchors to the table. The ring is bored 1/64-in. oversize to permit its cocking. A shoulder screw, in a liberal clearance hole, retains one side. A blind hole on the inside, at the opposite side, is fitted with a spring-loaded round nosed pin to maintain the clearance away from the screw.

To raise the table, it is now only necessary to unlock the clamp and lift. To lower it, the operator merely presses the ring down after unlocking clamp and making sure he has the weight of the table under his control.

H Koslow, Bronx, NY

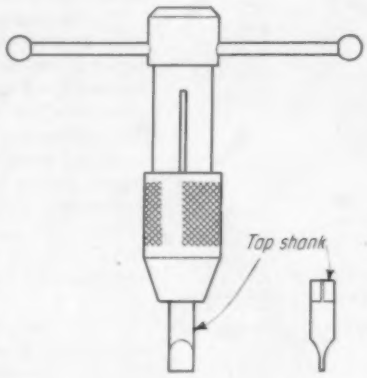


Special Screwdriver Bits Made from Tap Shanks

I'm not advocating saving what's left of all broken taps, but there will be times when a tap shank can be converted into a very useful tool. As an example of this, screwdriver bits in all their variations can easily be made without further treatment than to grind them to shape.

The simplest of these — the flat blade for the common slotted screw —is illustrated. Here it is held in a standard T-handle tap wrench for a solid grip on screws in hard-to-get-at locations. Also, in instrument or similar work where scratches or burrs are objectionable, a custom fitted driver will do a better job.

M. W. Loftus, Chicago, Ill.



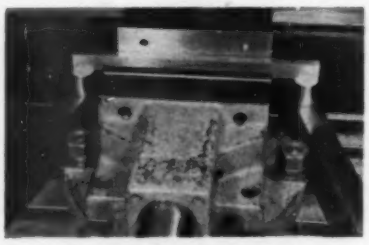
Outreach Parallel Remedies Milling Difficulties

Assuming accuracy being of prime importance in all vise-held milling operations, outreach parallels offer decided advantages over the customary ones that rest on the bottom of the vise. The first of these is that cleanup between each work loading is simplified and, secondly, bedding down the work with a mallet is unnecessary.

Ordinarily, more often than not, parallels resting on the bottom would have to be removed from the vise for a complete cleanup job at each changeover, and then reinstalled before the work is placed on them and pounded down to insure contact. But with this method, the work is simply set on the parallel, after it has been wiped or brushed clean, and held down while the vise is being tightened.

The photo shows how the main parallel is supported on each side of the vise by a pair of identical parallels and blocks placed directly on the machine table. Not only will this make for a cleaner operation but accuracy will also increase with resting points of the main parallel so widely separated.

J C Magee, Schenectady, NY



H Koslow
Bronx, NY
Won $25 for his idea:

Turret Depth Stop Speeds Drillpress Operation
in the Mar 6, 1961 issue

AN EXTRA $25 will be paid for the best Practical Idea in each issue of *American Machinist/Metalworking Manufacturing*. Selection of the winning ideas made by a group of our readers.

PAYMENT—in addition to regular rate for item published—will be made as soon as tabulations are completed. The winner or winners—in case of a tie when duplicate prizes will be awarded—will also be announced in these pages.

JUDGES . . . are a group of *American Machinist/Metalworking Manufacturing* readers who select articles they prefer in a particular issue. This group changes entirely with each issue and represents a true cross-section of our readers. Their decision is accepted by the editors, without reservations or bias, as final in each case.

REQUIREMENTS—All items appearing in the Practical Ideas pages are eligible. They must be submitted by the originator on an exclusive basis. Do not worry about your shortcomings as an author, draftsman, or photographer—every item will be edited in accordance with *American Machinist/Metalworking Manufacturing* standards. Readers will judge only the finished product—in terms of its usefulness to them.

WHO MAY ENTER—Anyone may enter except employees of McGraw-Hill Publishing Co. Inc, and those of its advertising agencies or departments. Suggest to your employes that they submit ideas.

HOW TO ENTER—Send all entries to: "Practical Ideas Editor" *American Machinist/Metalworking Manufacturing*, 330 West 42nd Street, New York 36, NY.

Names in the News

Cone Automatic Machine Co, Windsor, Vt, has appointed **J Arnold Kiely** (left) executive vice president, and **Robert R Rhodehamel** vice president, manufacturing

Standard Tool & Manufacturing Co, Lyndhurst and Arlington, NJ, has promoted **Stephen C Tiensch** from manager of manufacturing to vice president, manufacturing.

Chrysler Corp has named **William P Balthrop** president of the Airtemp Division, Dayton. Formerly president of the Amplex Division, he succeeds **P M Augenstein** who has resigned. **Frank Walter** has been appointed director of product planning and chief engineer of the Plymouth Division to succeed **Jack E Charpar** who has been awarded an Alfred P Sloan Fellowship for a year of advanced study at MIT.

Fairbanks, Morse & Co, Chicago, has named **A Leo West** vice president and group executive for the company's largest industrial complex at Beloit, Wis. **C E Clausen** has been appointed vice president, production, at Beloit, and **H E Hanson** vice president in charge of sales.

Famco Machine Co, Kenosha, Wis, has appointed **L G Enroth** general sales manager and **C George Mattusch** assistant sales manager. Mr Enroth has been serving as Detroit district sales manager and Mr Mattusch has managed sales in the Chicago district.

Bay State Abrasive Products Co, Westboro, Mass, has named **Charles G Gould** general manager of **Felker Manufacturing Co,** Torrance, Calif, a diamond wheel and machine manufacturing subsidiary. Mr Gould is assistant treasurer of Bay State.

General Electric Co has appointed **W R King** manager of metalworking machinery industries sales. He has been manager of machine tool industry sales since 1944. •

Jones & Lamson Machine Co, Springfield, Vt, has elected **Robert S Jones** vice president and general manager. Associated with J&L since 1940, Mr Jones has been serving as general manager

Landis Machine Co, Waynesboro, Pa, has announced that **D E Stoner,** former works manager of the Landis Tap Division, has been appointed works manager of the entire plant following the retirement of **Leon H Randolph**

Pratt & Whitney Co, West Hartford, Conn, has elected **Asa E Snyder** vice president. Formerly director of research, he will continue to supervise operations of P&W's Research Department

Clark Equipment Co, Buchanan, Mich, has elected **Walter E Schirmer** executive vice president. He was formerly vice president of the company and president of Clark Equipment International, C A

National Twist Drill & Tool Co has named **William I McClelland** general sales manager of Winter Brothers Co, Rochester, Mich, Tap and Die Division of the parent firm. He was formerly assistant sales manager

Ordinary hydraulic fluid made from mineral oil is ignited by open flame. Torch is 18 inches from nozzle orifice.

Shell Irus 902 Hydraulic Fluid, in the same test, refused to be ignited by 3000-degree flame.

BULLETIN:

3000-degree flame does not ignite Shell Irus 902—the fire-snuffing hydraulic fluid that helps make factories safe from fire

Shell forced Irus® 902 Hydraulic Fluid through a 0.0145-inch orifice at 1000 psi pressure. The Irus Fluid was sprayed from the orifice and a 3000-degree flame thrust into the streaming fluid. Irus was not ignited.

Read the advantages of economical Shell Irus 902 and how it can protect your plant.

IRUS 902 is the fire-snuffing hydraulic fluid that protects lives and equipment.

How Irus works

Irus 902 is an ingenious combination of oil and water. The water is encased in a film of oil. In technical terms, it is a 100% water-in-oil emulsion.

But unlike other emulsions, Irus 902 has optimum stability. This is vitally important. It means that Irus Fluid will retain its lubricating qualities far longer than unstable oils—and will not allow the water to separate out. Result: the water stays in the oil, ready to snuff a fire if needed.

Other advantages

1. Cools off systems. Because of its high rate of heat transfer and high heat capacity, Irus 902 can allow hydraulic systems to run cooler.

2. Resists thickening and thinning. The viscosity of Irus 902 is tailored to protect pump parts during the entire working cycle—from cold start-up to hot, continuous operation.

3. Saves gaskets, packing, hose. Irus 902 is gentle to nonmetallic parts as well as metal. It can be used almost anywhere that you'd use mineral oil.

4. Resists foaming. Irus 902 does not hold captive air. If air is introduced, Irus 902 quickly releases it.

5. Easier to spot leaks. Irus 902 is bright yellow, helps you spot leaks quickly.

For complete details about changing over to Shell Irus 902, contact your nearest Shell Industrial Products Representative. Or write: Shell Oil Company, 50 West 50th Street, New York 20, N. Y.

A message to manufacturers of hydraulic equipment

Shell Irus 902 makes an excellent initial fill.

1. It is available anywhere in the U.S.A.

2. Quality of Irus Fluid is consistently high. It must meet strict Shell specifications.

SHELL

A BULLETIN FROM SHELL
—where 1,997 scientists are working to provide better products for industry.

Cemented Carbide Tools Show 325,000 psi Transverse Rupture Strength, Rh 39A

A new method of cementing the basic ingredients in conventional carbides results in a material called Newbide that has grades with a hardness of Rh 91.2 to 93.0A and transverse rupture strengths from 225,000 to 325,000 psi.

To form Newbide, tungsten, tantalum, titanium, columbium, cobalt, and iron—the normal ingredients of carbides—are heated together with menstruum metals under a vacuum and at high temperatures. This forms a fused solution of closely controlled carbide phases consisting of high purity crystals, which is then ground in conventional ball mills to a powder less than one micron in size for final sintering and fabrication into tool blanks and inserts.

Sintering in a controlled temperature and vacuum atmosphere precipitates the various carbide phases into uniform grains of a size from 1 to 3 microns. These grains fit together in jigsaw puzzle style (see microphoto) and give a thin, uniform distribution of the binding metals.

The binding metal is a eutectic alloy rather than a single auxiliary metal and the company says that this gives lots of the new carbide with absolute consistency.

In one test, the carbide was used to machine rods, 7-in. in dia and 7-ft long from chrome-vanadium forgings. The rods had to be machined at a Brinell hardness of 480 to 500, and standard tooling used at 0.25 feed per revolution and 125 sfm failed after approximately 1 in. of cut. With Newbide N70, the manufacturer reports that roughing and finishing cuts were completed at the same feed and surface speed without any occurence of failure.

Newbide is available in five grades, one for cutting cast iron and four for steel.

Newcomer Products Inc, Latrobe, Pa

MORE DATA? Circle 76, inside back cover

Jigsaw puzzle pattern of grains in carbide solution gives uniform distribution of binding metals, results in high transverse rupture strength.

McKay Hard-Surfacing Electrodes Give Fast Transfer, Smooth Bead

McKay Hardalloy 48 is an iron powder, low hydrogen, hard-surfacing electrode with deposition rates that are said to be 50% higher than conventional coated electrodes. Surface of the weld bead is extremely smooth and retains hardness at relatively high temperatures.

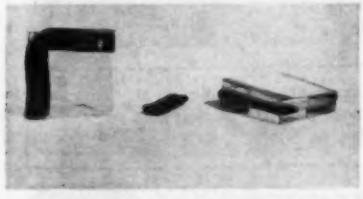
Slag is reportedly easy to remove and although high operating currents are used, penetration and dilution of the base metal is said to be kept to a minimum consistent with a good bond.

The electrodes, which are supplied in ⅛, 5/32, and 3/16-in. sizes and standard 14-in. lengths, give an as-deposited hardness on 12-to-14% manganese steel of Rh 41C for one layer. Hardness increases to Rh 46C by the third layer.

Each pound of Hardalloy 48 covers 18 to 22 sq-in., ⅛-in. thick.

The McKay Co, 1005 Liberty Ave, Pittsburgh 22, Pa

MORE DATA? Circle 78, inside back cover



Extruded Sealers Allow Sealing Uneven Joints, 90-Deg Corners

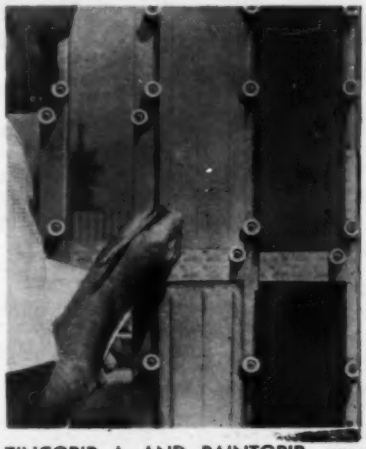
Cross sectional "double donut" design of these new sealers permit positive sealing of uneven or tapered joints and 90-deg bending without the need of cutting and fitting operations. The rubber-base extruded sealers, designated EC-121, (hollow) and EC-2131 (solid) are designed to seal between mating metal surfaces. They act as rubbery gaskets when pressed into a seam and tightened between the sealing surfaces.

When sealing mating metal surfaces, the sealers are pressed to one of the surfaces by hand and, because they are adhesive, they will remain in place even in vertical position until the surfaces are assembled.

The sealers are said to have excellent moisture, salt spray, and weathering resistance.

Minnesota Mining and Manufacturing Co, 900 Bush Ave, St Paul 6, Minn

MORE DATA? Circle 77, inside back cover



ZINCGRIP A AND PAINTGRIP, new hot-dipped zinc-coated steels, are shown at top painted and unpainted after three years exposure. Comparison panels at bottom are painted and unpainted cold-rolled steel phosphate-treated for painting. Paint was same; scribe marks breaking painted surface are part of test. Rust on bottom panels is apparent—*Armco Steel Corp, Middletown, Ohio* •

MORE DATA? Circle 79, inside back cover

1000 Tons High Alloy Steels
PRECISION-SHEARED Monthly

1/16" to 1-1/8" Thicknesses Cut Efficiently on Steelweld Shear

Steelweld mechanical shear No. 24GA-12 cutting a 9/16" x 124" plate of 304 chrome nickel.

Some interesting details of this machine:

Capacity 1½" x 12'-0" mild steel — 8" stroke — 21 strokes per minute — 48" motorized back gauge — 20'-0" squaring gauge arm — 7'-0" front gauge outriggers — slitting guide — centralized lubrication system — air-operated ball transfers.

Adjusting gap between knives to provide correct clearance for plate thickness being cut. This adjustment is made in seconds, not hours, as required for some shears. Indicator has scales reading in plate thicknesses and in thousandths of an inch knife clearance. Note convenient up-front location of this important feature.

Addition of a Steelweld Shear boosted shearing capacity tremendously for Jessop Steel Company, Washington, Pa. More than 1000 tons of fine quality stainless, tool, high-speed and related alloy steels for which this 60-year old producer is noted, are sheared monthly on this machine — and every cut is sharp, straight, accurate.

The shear works continually 16 hours a day, 5 days a week, cutting thicknesses from 1/16 to 1⅛ inch. Frequently plate up to 240 inches long are slit by use of the Steelweld slitting arrangement.

The three Steelweld features most impressive to Jessop officials are:

1. The fast easy knife adjustment which can be quickly set to provide the best cut for every plate thickness.
2. The immediate, positive operation and long trouble-free life of Steelweld's air-cooled clutch and brake.
3. The massiveness and rigidity built into the frame and all working parts.

Jessop Steel has found that knives last three times as long on its Steelweld because of the knife adjustment feature. This means an important saving in knife costs, as well as a big reduction in down-time normally required for rotating or changing knives.

"A very fine operating shear" . . . "A machine that is doing a good job for us" . . . These are some of the comments of Jessop Steel production executives.

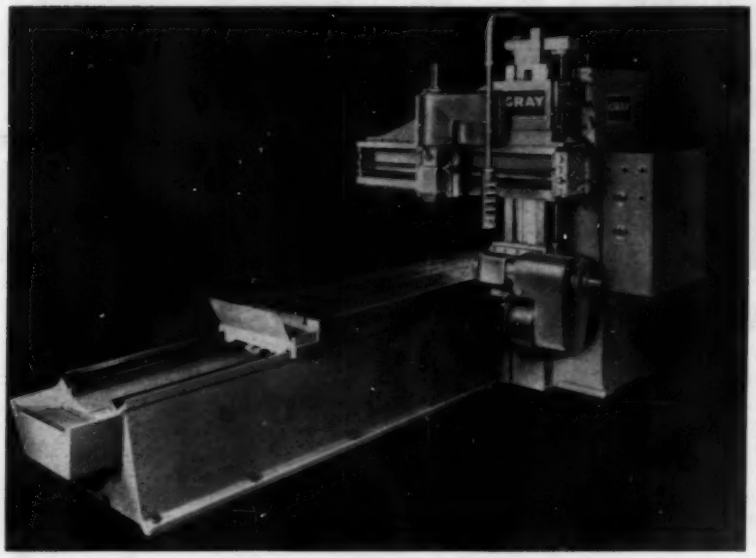
Steelweld Shears are available in all sizes for cutting steel plate to thicknesses of 2" and in lengths to 30'-0".

Write for free copy of catalog No. 2011

STEELWELD PIVOTED BLADE *Mechanical and Hydraulic* **SHEARS**

Steelweld Machinery includes: Mechanical & Hydraulic Shears and Press Brakes, One-, Two- and Four-Point Straight-Side Presses, Speed-Draw Presses.

STEELWELD MACHINERY DIVISION • THE CLEVELAND CRANE & ENGINEERING CO. • 1464 E. 282 ST. • WICKLIFFE, OHIO



Gray Compact Openside Milling Machine Built Along Lines of 'Flying Scot' Planer

The Handymill, a compact "budget priced" openside milling machine, has a special milling head that is square-locked to the rail on nonmetallic bearing ways for rigidity in carbide milling.

The special head contains a 10-hp totally-enclosed fan-cooled ac motor with a cog belt that drives a 4-step pulley to the spindle drive. This drive is a 2-speed balanced planetary gear system which is self-oiled and gives a choice of eight spindle speeds from 67 to 652 rpm. Nose of the head is a No. 50 NS taper and is interchangeable with standard right angle attachments. Any combination of rail and side heads may be set up on the machine.

The Handymill resembles, in outer appearance, the company's Flying Scot economy-priced planer (*AM*—Aug 22 '60, p220) and, like the planer, it mounts the motor behind the column and alongside the bed so that it is farther from chips and dust.

To allow for possible misalignment of the motor and the vibration, wear and strain that would result, the drive runs through a large-dia tubular shaft with a flexible connection at both ends.

The motor is placed at the rear of the column with a helicone transmisison in which the bull-gear shaft is at a 20-deg angle iron from the transverse plane and the motor drive is at a 20-deg angle to the V.

Overlapping action between the rack and the bull gear assures smooth drive-action (there are always three or more teeth in mesh), and the rack has a 1½-deg helix angle to eliminate side thrust that might occur with a straight rack. This new drive and transmission permits table and rail feeds from 1 in. to 40 in. per min over an infinite range.

The miller table is a box section with vertical center posts that run its entire length and patented gibs that prevent lifting of the work when it overhangs the table.

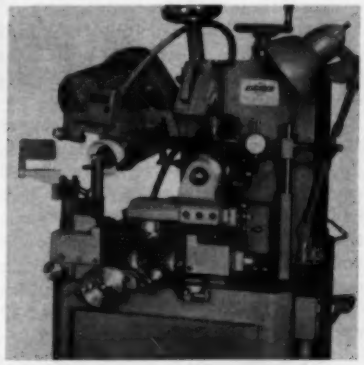
Duplex tables are offered as optional equipment and, with this setup, work can be planed on the first table while the second is being loaded. At the completion of planing, the first table can be removed and brought around for loading while the second is under the head. Thus an endless cycle can be achieved and the miller can be run continuously.

Another optional feature is nonmetallic table ways composed of laminated plastic plates held in place by laminated plastic pins. They are said to increase load carrying capacities 100% over the max capacity of iron ways and to eliminate cutting and scoring of bed ways.

The Handymill will be available in 30-, 36-, and 42-in. basic sizes on a production basis in October. Price of a basic 30-in. machine with one 10-hp rail milling head is $33,700.

The G A Gray Co, Cincinnati, Ohio

MORE DATA? Circle 51, inside back cover



Centra-Point Grinder Simplifies End Mill Radial Relief Grinding

New addition to the company's line of end mill grinders, the Model B, incorporates all the operating features of the previous models plus increased capacity and a simplified system for grinding eccentric or radial relief of end mills and milling cutters with helical teeth.

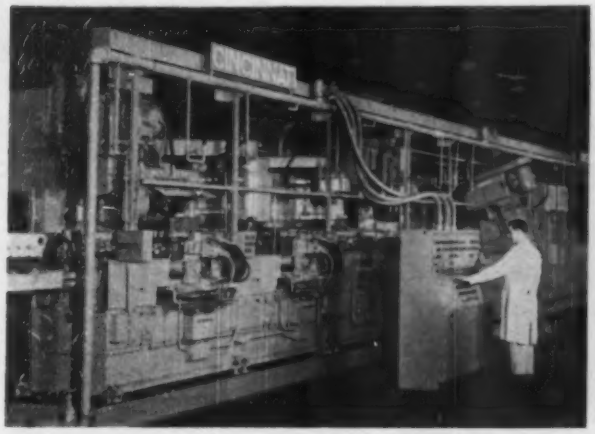
Wheel head on this model is a compound angular type with a 50-deg clearance angle adjustment and a 15-deg contact angle adjustment. Rotation of the grinding wheel spindle is instantly reversible.

The grinder work head has a totally enclosed rapid-indexing mechanism and a 2-in. hole through the spindle giving a collet capacity of 1¾ in.

Other features are an optical parallel gage for setting the teeth of nonradial cutters into indexing position and a wheelhead column with a 7-in. lateral adjustment.

William H Field Co, Inc, 323 Dorchester Ave, Boston 27, Mass

MORE DATA? Circle 52, inside back cover



Cincinnati's Special Machines Have Building Block Design

Because they use the building-block design principle, Cincinnati Milling Machine Co is making special, multiple-operation machines—both rotary-indexing and in-line transfer—from a series of basic components that are common to both designs.

A center bed determines the major configuration of each machine. This bed is rectangular for in-line machines and essentially round for rotary-index equipment. Wing bases or center columns bolted to the beds support the workholding devices and the work transfer or indexing mechanisms which, in turn, support headstocks or horizontal feed units. Spindle carriers, broach holders, and drill units are added to complete the basic machine structure. Finally, individual hydraulic units attached to the wing bases or columns make each operating position a self-contained machining station.

The in-line transfer machine (left) performs 26 operations on V-8 aluminum engine blocks. These include milling, broaching, drilling, and boring each block at 120 per hour.

Eleven identical rectangular center-bed sections—bolted end to end—make up the 77-ft long machine. Each bed contains one section of a continuous walking-beam transfer bar—as long as the bed—that lifts the blocks and carries them from one station to another.

The rest of the assembly consists of wing bases supporting feeding units and other equipment described above.

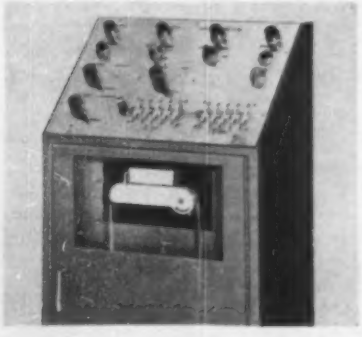
The company's rotary index machine (right) turns out 600 small cotton picker spindles an hour. Although the spindles are relatively simple in design, a special machine is required because both right- and left-hand spindles must be machined together at this rate.

Spaced around the center bed on this machine are five stations put together from basic building blocks.

A Cincinnati Feedmatic hopper loads four spindles into each fixture at the first station. Then, relief grooves are milled into the spindles at the next station where shallow holes are also drilled in the first two spindles in each fixture. This separates the left-hand parts from the right-hand parts.

Station three broaches barbs on left-hand parts, and station four broaches the right-hand ones. At the last station, the spindles are ejected from the fixtures and pushed through a carbide deburring bushing.

Cincinnati Milling Machine Co, 4701 Marburg Ave, Cincinnati 9, Ohio MORE DATA? Circle 53, inside back cover



Moog Pneumatic-Hydraulic N/C System Positions at 1000 ipm

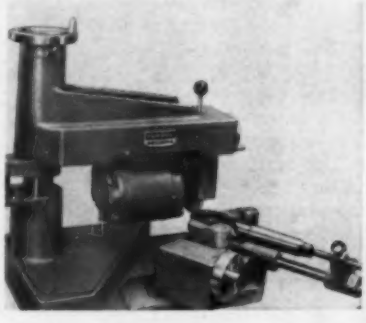
This two-axis Hydra-Point numerical positioning system, which was exhibited at the Tool Show, gives table positioning speeds of 200 to 1000 ipm, according to the company. It provides for automatic, semi-automatic, and manual modes of operation.

The system, which is said to have demonstrated high reliability, needs simplified servicing and has no lead-screw error. It is actuated by standard eight-channel, one-inch binary decimal coded, block format tape, in either reel or continuous loop type.

The low-cost, non-electronic control, first demonstrated in prototype form at the Production Engineering Show in Chicago, is now available in production models.

Industrial Div, Moog Servocontrols, Inc, Proner Airport, East Aurora, NY

MORE DATA? Circle 54, inside back cover



Farrel-Sellers Drill Point Machine Thins, Centers Points

This new compact, bench-type drill point thinning machine—which has a self-contained motor—will thin and

center the points of ½ to 3-in. diameter drills as long as 24 in. The grinding wheel is mounted on the shaft of the motor.

Because the drill is held at three points—by hardened jaws on the leading edges of the flutes, just back of the cutting edges, and by an adjustable center at the end of the shank—the body of the drill is entirely free of any contact with the chuck.

In operation, the machine grinds a groove of the proper depth on each side of the web.

Farrel Birmingham Co, Inc, Consolidated Machine Tool Div, 565 Blossom Rd, Rochester 10, NY

MORE DATA? Circle 55, inside back cover

Operation Monitor Translates Vibrations Into Machine Check

Series 18 operation monitors (*AM/MM*—May 15 '61, p3) translate the amplitude and frequencies of signals obtained by pickup devices attached to machines or processes into normal and off-normal indications. In this way, they tell whether or not a machine or process is operating at normal, and how far off it is if it is. Panel lamps give normal, alert, and alarm relay actions.

The instruments have a capacity of two data channels, each with two limit levels. These channels may be excited by two separate transducers, or they may be used to monitor two characteristics of a signal from a single pickup.

Frequency range of the monitor, which was introduced at the Tool Show, is 2 cps to 10 kc/sec; it measures amplitudes as low as 0.000,002 in. Applications include machine tool vibrations, bearing and balance conditions in turbines, pumps, or compressors, material homogeneity inspection, mixing end point, fluid flow turbulance or cavitation, and acoustic process monitoring.

Also introduced at the Tool Show was the Model 41 vibration signal analyzer and portable balancer designed for the study and analysis of vibration sources in machinery, buildings, and pipe lines. The instrument, which is priced below $2000, incorporates modular construction and complete transistorized circuitry for reliable operation and low power consumption.

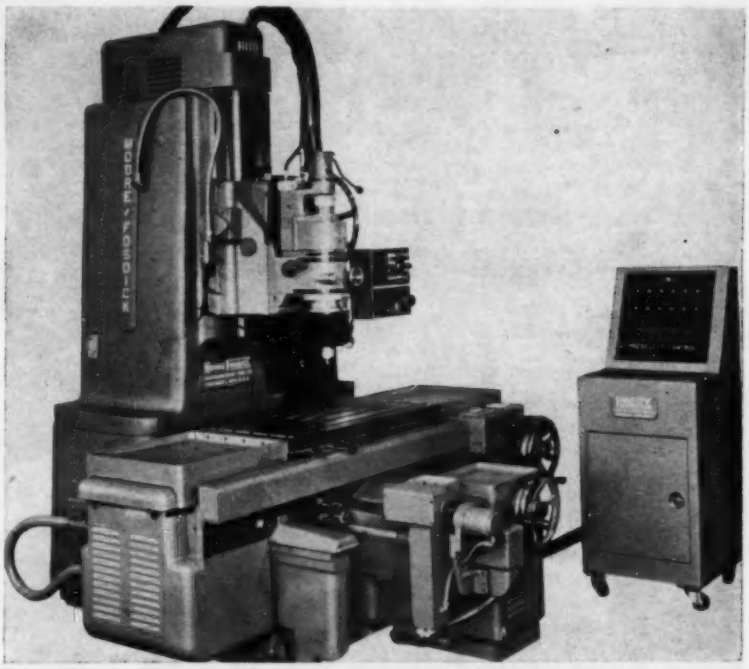
Amplitude range is 5 microin. to 100 millin., frequency range is 3 to 10,000 cps and from 180 to 100,000 cpm, and velocity range is 50 microin. to 100 in. per sec. Accuracy of these ranges is reported to be ±2%.

RayData Corp, 1078 E Granville Rd, Columbus 24, Ohio

MORE DATA? Circle 56, inside back cover

MAGNETIC LEVEL READS HORIZONTAL, 45-deg and 90-deg angles with one bubble, and has magnets in its base that allow an operator to read both flat and curved surfaces with both hands free. The 3⅛-in. long level weighs 2½ oz and sells for $4.95. A belt pouch and an adapter for nonferrous metals are $1.00 each—*Alantea International Inventions Corp, 380 Lexington Ave, New York, NY*

MORE DATA? Circle 57, inside back cover



Fosdick Remote Numerical Control for Jig Grinders Permits Manual Preselect Input

Fosmatic preselect control displays a series of dials to a jig-borer or jig-grinder operator that allow him to preselect the next operation while the first one is being performed. As soon as the first operation is finished, the operator presses a button that sends the machine to its new location for the second operation.

Control is similar to complete tape control (here, manual input is substituted for tape input) and the preselect control is completely interchangeable with Fosmatic numerical control console, which offers both tape and manual input.

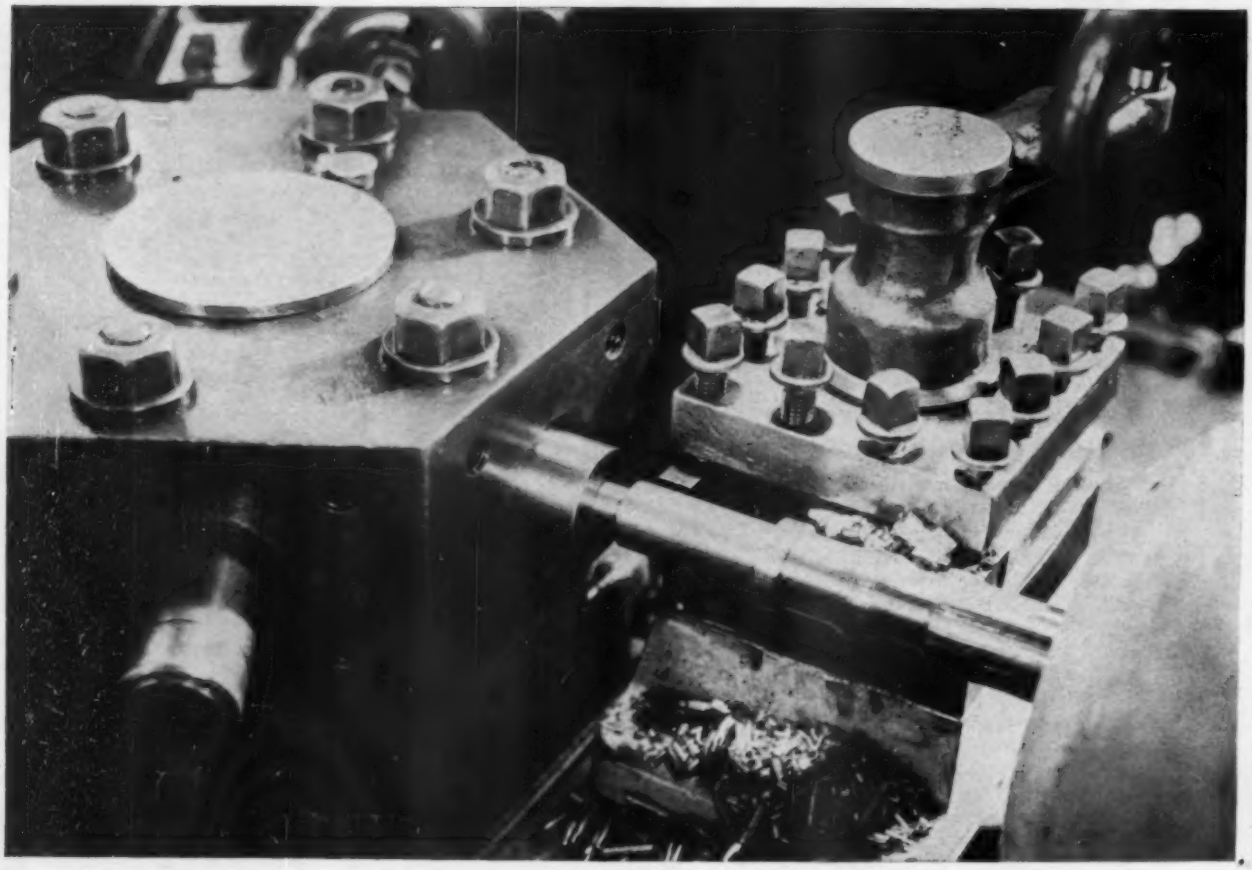
The new system costs less than tape control and is said to eliminate delays in setting locations.

Fosdick Machine Tool Co, Cincinnati 23, Ohio

MORE DATA? Circle 58, inside back cover

New steels are born at Armco

CONTROLLED HARDNESS—Your key to costs with Armco Stainless Types



lower machining 410 and 416

Durability, Strength, Economy

Special Armco Process Tightens Controls on Hardness Range

Uniformity you can rely on. That's the cost-saving advantage of Types 410 and 416 Armco Stainless Steels specially heat treated for *Controlled Hardness.*

For example . . .

Bars supplied to standard ranges Rockwell C26-32 or C32-38 show consistency of hardness far superior to that of regular hardened and tempered Types 410 and 416. This holds true with equal ranges anywhere between Rockwell C26 and C38.

Simplify shop routing. Eliminate problems of surface and distortion caused by excessive hardness variations. Order Types 410 and 416 stainless steel with *Controlled Hardness* from a steel service center listed in this ad. They are available in the same broad range of sizes, shapes, finishes and tolerances as regular Types 410 and 416. Armco Division, Armco Steel Corporation, 1651 Curtis Street, Middletown, Ohio.

Get Armco Stainless Steels from these Steel Service Centers

(A) Sheets, Strip and Plates (B) Bars and Wire

AMERICAN STEEL & ALUMINUM CORP. (AB)
Hartford, Conn.

AMERICAN STEEL & ALUMINUM CORP. OF MASS. (AB)
Cambridge, Mass.

BROWN-WALES COMPANY (AB)
Cambridge, Mass. – Auburn, Maine – Worcester, Mass.

CENTRAL STEEL & WIRE COMPANY (AB)
Chicago, Ill. – Cincinnati – Detroit – Milwaukee

CHICAGO STEEL SERVICE COMPANY (AB)
Chicago, Ill.

CLEVELAND TOOL & SUPPLY COMPANY (B)
Cleveland, Ohio

THE CONGDON AND CARPENTER COMPANY (AB)
Providence, R. I. – Fall River, Mass.

C. A. CROSTA, INC. (A)
Denver, Colo.

DUCOMMUN METALS & SUPPLY COMPANY (AB)
Los Angeles, Calif. – Berkeley – Phoenix – San Diego – Seattle

EDGCOMB STEEL & ALUMINUM CORP. (AB)
Hillside, N. J.

EDGCOMB STEEL COMPANY (AB)
Philadelphia, Pa. – Charlotte, N. C. – Greensboro, N. C. – York, Pa.

ESCO CORPORATION (AB)
Portland, Oregon – Denver – Emeryville, Calif. – Eugene, Oregon – Honolulu – Los Angeles – Seattle – Spokane – Vancouver, B. C.

PETER A. FRASSE & COMPANY, INC. (AB)
New York, N. Y. – Buffalo – Hartford – Lyndhurst, N. J. – Philadelphia – Syracuse

FIRTH BROWN STEELS LTD. (AB)
Montreal, P. Q. – Toronto

GATE CITY STEEL, INC.—OMAHA (A)
Omaha, Nebr.

INDUSTRIAL STAINLESS STEELS, INC. (B)
Cambridge, Mass. – Buffalo, N. Y.

EARLE M. JORGENSEN COMPANY (AB)
Los Angeles, Calif. – Dallas – Denver – Honolulu – Houston – Oakland – Phoenix – Seattle – Tulsa – Wichita

MAPES & SPROWL STEEL COMPANY (AB)
Union, N. J.

METAL GOODS CORPORATION (AB)
St. Louis, Mo. – Dallas – Denver – Houston – Memphis – New Orleans – N. Kansas City, Mo. – Tulsa – Wichita

MONCRIEF-LENOIR MFG. COMPANY (AB)
Houston, Texas – Dallas – Harlingen – Lubbock – San Antonio – Temple

MORRISON STEEL COMPANY (AB)
New Brunswick, N. J.

THE ORLEANS STEEL PRODUCTS COMPANY, INC. (A)
New Orleans, La.

WILLIAM M. ORR COMPANY, INC. (AB)
Pittsburgh, Pa.

PAPER-CALMENSON & COMPANY (A)
St. Paul, Minn.

RICHARDS & CONOVER STEEL & SUPPLY COMPANY (A)
Kansas City, Mo.

SEABOARD STEEL & IRON CORP. (B)
Baltimore, Md.

SENECA STEEL SERVICE, INC. (AB)
Buffalo, N. Y.

SOUTHER STEEL & ALUMINUM COMPANY (A)
St. Louis, Mo.

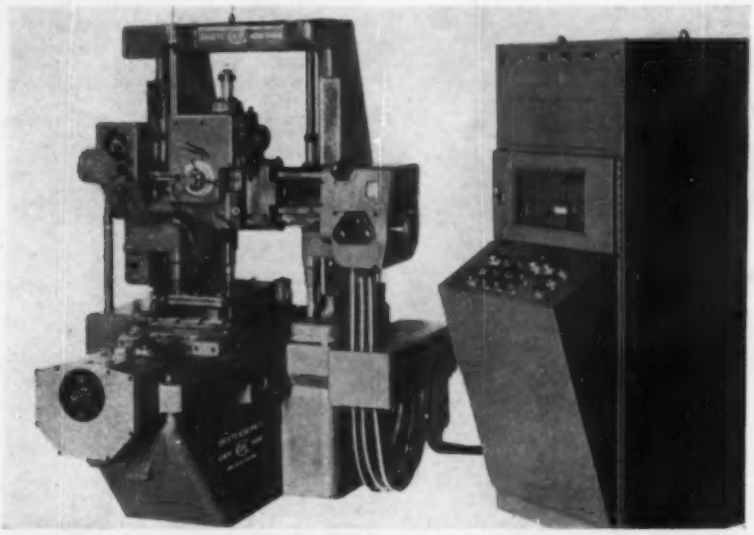
J. M. TULL METAL & SUPPLY CO., INC. (AB)
Atlanta, Ga. – Birmingham – Greenville, S. C. – Jacksonville – Miami – Tampa

VIKING STEEL COMPANY (AB)
Cleveland, Ohio

VORYS BROTHERS, INC. (AB)
Columbus, Ohio

YORK CORRUGATING COMPANY (A)
York, Pa. – Washington, D. C.

ARMCO Armco Division



SIP Adds Sperry N/C System to Jig Borer That Positions Accurate to 80 Millionths

SIP has chosen the numerically controlled positioning system made by Sperry Gyroscope Co of Canada, Ltd for their 3K-CN jig borer which was introduced at the Tool Show in New York. The machine, which has a guaranteed positioning accuracy of 80 millionths over the entire table travel, repeats within 50 millionths, according to the company.

Tape — EIA standard one-in., 8-channel binary coded decimal — is prepared in endless loops to eliminate the necessity for rewinding. In addition to giving the position commands, the tape is coded to activate a change-tool light at proper imes. A position counter on the console gives a continuous indication of what operation is to be performed next.

After an operator pushes the next-position button, automatic positioning occurs along the shortest path. One inch in 8 sec and 10 inches in 25 sec are typical positioning times, and these include hydraulic clamping and unclamping of table and spindle head saddle. After movement is complete, an in-position light comes on and the operator knows to start his machining operation.

As in the conventional No. 3K machine, the basic measuring elements are precision leadscrews coupled to micrometer heads that have automatic correction cams to compensate for cumulative errors of displacement of the table and spindle head saddle. Backlash errors are eliminated because the final approach always occurs from the same direction.

Optical readout micrometer heads have a coarse scale reading to 0.05 in. and a fine graduation with vernier reading to 0.000.05 in. These give a visual check of automatic positioning.

American SIP Corp, 100 E 42nd St, New York 17, NY

MORE DATA? Circle 59, inside back cover

Single push-button at one side of the saddle starts positioning cycle. In-position and change-tool lights are controlled by tape to assist the operator

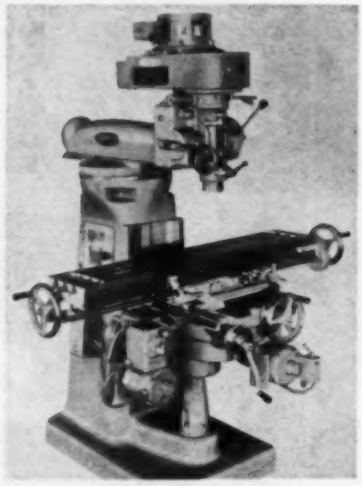
Miniaturized Electric Eye Control Operates With Dual Light Beams

Device may be used to eliminate timers and mechanical contacts when monitoring objects moving at random positions and varying speeds. One set of pickups is employed to time an inspection and another set to monitor the inspection.

The light beams may be direct light cut-off, or by reflection, or a combination of both. Both beams must concur in order to pass an acceptable unit. If a reject is detected the relay signal may be used to actuate an audible, visual alarm or a reject mechanism as a solenoid. In other cases, additional beams may be added to monitor two or more parameters when the timing beam says inspect.

Photomation Inc, 96 S Washington Ave, Bergenfield, NJ

MORE DATA? Circle 60, inside back cover



Vertical Mill Head Tilts Back, Forward, Rotates 360° on Ram

Model No. 645 ram and turret mill has a head that tilts 45° forward and back and rotates 360° on the ram. The turret rotates 360° on the column and the power assembly rotates 360° around the spindle.

In addition, 18-in. knee travel and 25½-in. overarm travel are said to simplify setups and provide for quick setting of any compound work angle.

Other specifications include; spindle to table range of 0 in. to 19 in., distance range of 1½ in. to 27¼ in. from the center line of the spindle to the column ways with the spindle in vertical position, and 0 in. to 31½ in. with spindle tilted backwards and forwards.

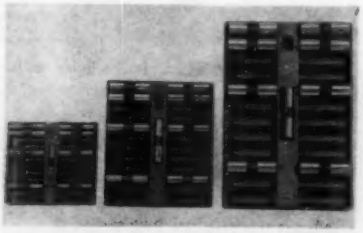
Cross travel of table is 1 in. (12 in. as an extra) longitudinal travel is 26 in. on the standard 9 by 40-in. table, and spindle vertical travel is 5 in. Nine spindle speeds are obtainable with the standard 1-hp motor and there are three spindle feeds, adjustable depth, and power feed, up as well as down.

The company offers many optional

features among which are 46-in. table, longitudinal power feed with 8 speed changes, chrome plated ways, coolant system, rizer blocks, and rapid traverse.

Index Machine Co, 547 N Mechanic St, Jackson, Mich

MORE DATA? Circle 61, inside back cover



9-Gage Set Provides 33 Gaging Tolerance Limit Combinations

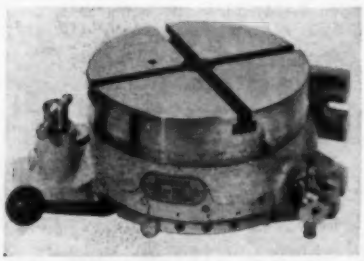
Class X accuracy of plus 40 millionths, minus nothing is provided with these new nine-gage sets, which have 1-microinch finish and give 33 gaging-tolerance limit combinations around most commonly specified hole sizes. The sets are available with nominal sizes in 64ths from 3/64 in. to 1 in., in most number sizes for 1 through 61, and in many decimal sizes.

A set consists of a nominal gage plus eight gages ranging up and down from the nominal in graduations of 0.0001, 0.0002, 0.0005, 0.0010 in.

Gages have two gaging surfaces for double wear-life. One end can be used for routine production and checking and the other for final gaging.

Deltronic Corp, 929 Baker St, Costa Mesa, Calif

MORE DATA? Circle 62, inside back cover



Universal Spacer Gives Choice Of Seven Different Divisions

A fast-acting spacer for drilling, milling and grinding operations, the Speedi-Spacer automatically locks after indexing has been accomplished and gives an operator the choice of seven divisions without the addition of special masking plates or blockouts.

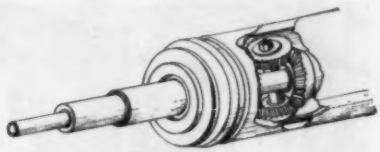
2, 3, 4, 6, 12, or 24 divisions are available in the standard model and other divisions can be obtained with special master plates. Divisional accuracy is said to be 40 seconds or better.

The spacer, which can be used in both vertical and horizontal positions, has two actuating levers; long, for standard operations and short, for close space requirements.

It is available with T-slotted platen (shown above) or with plain platen or chuck.

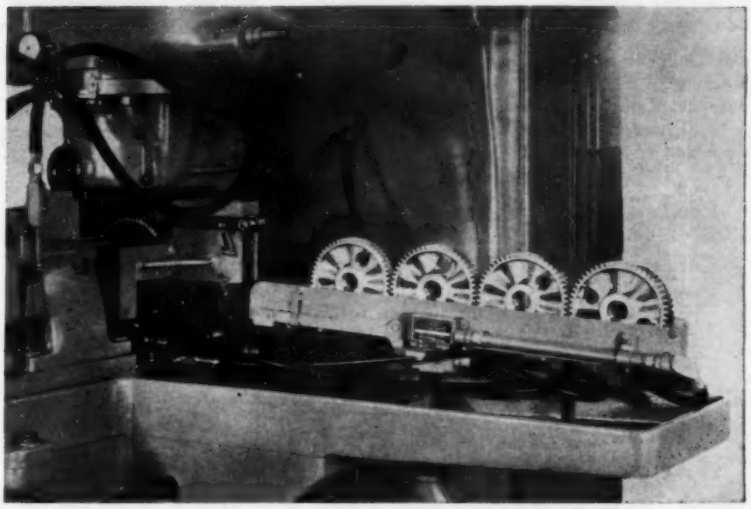
Universal Vise and Tool Co, Parma, Mich

MORE DATA? Circle 63, inside back cover



SINGLE END ENCLOSED DIFFERENTIAL, T753, is made in sizes 5, 8, 11, 15, and 18. Engineered for high-speed rotation, minimum backlash, low break-away torque, and maximum rotational torque output, they have precision ball bearings throughout and are stainless steel and aluminum in construction—*Sterling Precision Corp, 5 Sintsink Dr, Port Washington, LI, NY*

MORE DATA? Circle 64, inside back cover



Red Ring In-Line Automatic Loader Allows Handling Large Diameter Gears

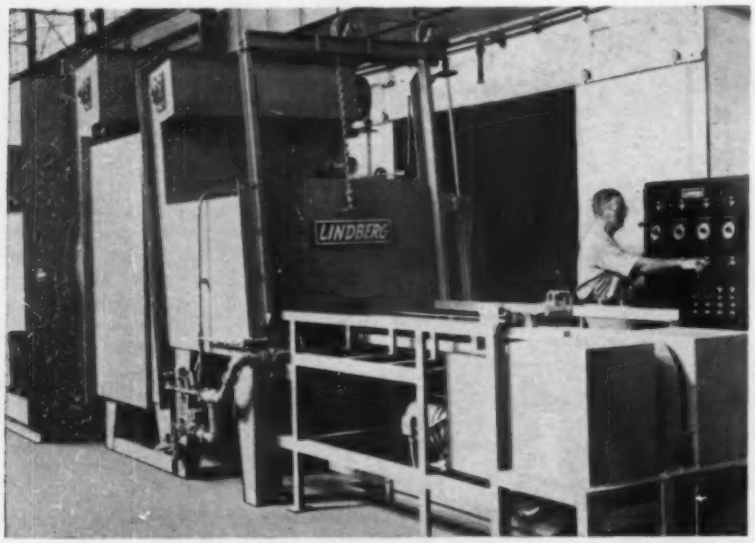
The Red-Ring in-line automatic loader permits a straight-line flow of gears through a conventional rotary gear shaving machine. Unlike the conventional Red-Ring machine which infeeds and returns shaved gears at the front of the machine, the in-line method feeds gears in a straight line across the machine or through a battery of machines. This method permits handling of larger diameter gears than was previously possible in a shaving machine of equivalent size.

In operation the gears are first rolled between a pair of gaging gears mounted at the entrance end of the magazine. Oversized gears are thus prevented from entering the magazine and the shaving cutter is protected from damage. In the magazine, the gears roll into a position in front of the shaving cutter where they are automatically picked up by one of the jaws on the slide and placed in shaving position while the other jaw in the slide places a finish-shaved gear in the exit chute. The gear is then chucked by the air powered tailstocks, the jaws lower and the slide returns to start position. At the end of the automatic shaving cycle, the tailstocks release the shaved gear and it is picked up by the exit-feed jaw.

The loaders can be provided for all sizes of Red Wing Model GCU-8 in., 12 in., and 18 in. rotary gear shaving machines.

National Broach and Machine Co, 5600 St Jean, Detroit 13, Mich

MORES DATA? Circle 65, inside back cover



FULL MUFFLE HYDROGEN-ATMOSPHERE FURNACE is designed for bright heat treating of aircraft and missile steels, stainless steels, and also for brazing of stainless. Capable of maximum temp of 2100 F, the automatic machine is electrically heated and has an accelerated atmosphere quench—*Lindberg Engrg Co, 2444 W Hubbard St, Chicago 12, Ill* MORE DATA? Circle 66, inside back cover

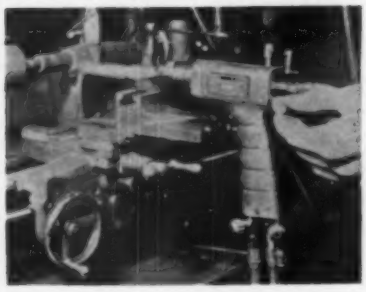
Special Vertical Mill Designed For Hydraulic Duplicating

Built from standard US Burke components, this mill is made to sell for less than similar machines used for hydraulic duplicating, according to the manufacturer. Extra rigidity is acquired by raising and lowering the knee to follow the contours of the master rather than actuating the quill. Heavy knee cylinder is mounted in place of a conventional vertical feedscrew, and manual vertical knee feed is retained to facilitate setup. Existing components used in developing this machine are the company's Millrite head and ram, an extended column, and the US vertical mill table, saddle and knee.

Air-hydraulic longitudinal feed to the table is available with either manual or automatic air-operated and mechanically controlled in-feed. In the case of air operation, the table is fed in automatically the pre-determined amount at the conclusion of longitudinal stroke. Table sizes are available from 10 x 36 in. to 10 x 54 in. in 6-in. increments with the larger sizes recommended for lighter workpieces.

US Burke Machine Tool Co, Cincinnati 27, Ohio

MORE DATA? Circle 67, inside back cover



New Spraywelder Unit, Two Alloys Introduced by Colmonoy

Model F is a medium capacity unit for application of Colmonoy Sprayweld powders to hard-surface a wide variety of metals and alloys. It is also suited for flame-spray metallizing with a broad range of materials.

Two new experimental hard-surfacing alloys developed by the company are Wallex No. 50, a cobalt-base powder of the cobalt-chrome-tungsten type which is designed for Sprayweld Process application; and Colmonoy No. 8, a nickel-chrome-boron alloy reported to provide better resistance to oxidation and corrosion, and improved resistance to high stress-abrasion. Latter is available in rod and powder form.

Wall Colmonoy Corp, 19345 John R St, Detroit 3, Mich

MORE DATA? Circle 68, inside back cover

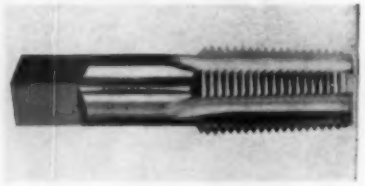
Nylon Clamps for Hydraulic Lines Range From ⅛ to 1¼-in. Dia

Clamp-Tite for use with hydraulic lines or electrical wiring harness has been engineered to withstand vibration or bending at any point. Molded wedge prevents entrapment or pinching of wires in harness bundles and also provides a true round diameter for retaining the harness or conduit, thus avoiding slippage and vibration. Special reinforcing ribs prevent bowing or weakening at any point.

These clamps are reported to be impervious to nearly all corrosive liquids and fuels, are self-extinguishing, and will not deteriorate in salt air. Manufacturer claims that as much as 65% in weight savings are accomplished over conventional metal and rubber units.

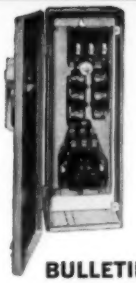
Olympic Plastics Co, 3471 S La-Cienega Blvd, Los Angeles 16, Calif

MORE DATA? Circle 69, inside back cover

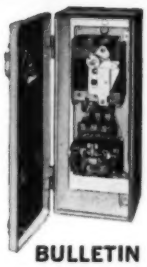


TAPER PIPE TAP MINIMIZES stop lines, produces an accurate thread which assures pressure tight joints, according to the manufacturer. The taps are recommended for stainless, steel forgings and castings, low carbon steels, leaded steels, zinc, alumium, and some bronzes—*Besly Welles Corp, South Beloit, Ill*

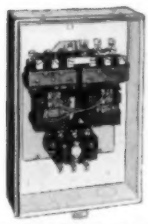
MORE DATA? Circle 70, inside back cover



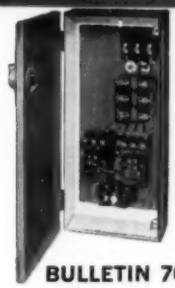
BULLETIN 712
Size 1 combination starter with fused disconnect switch



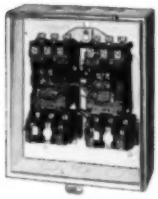
BULLETIN 713
Size 1 combination starter with circuit breaker



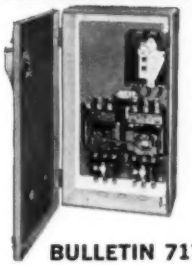
BULLETIN 705
Size 2 across-the-line reversing starter with overload relays



BULLETIN 706
Size 1 reversing starter with fused disconnect switch



BULLETIN 715
Size 1 across-the-line, multi-speed starter with overload relays



BULLETIN 717
Size 2 multi-speed starter with circuit breaker

BULLETIN 702
Size 3 three-pole, a-c solenoid contactor

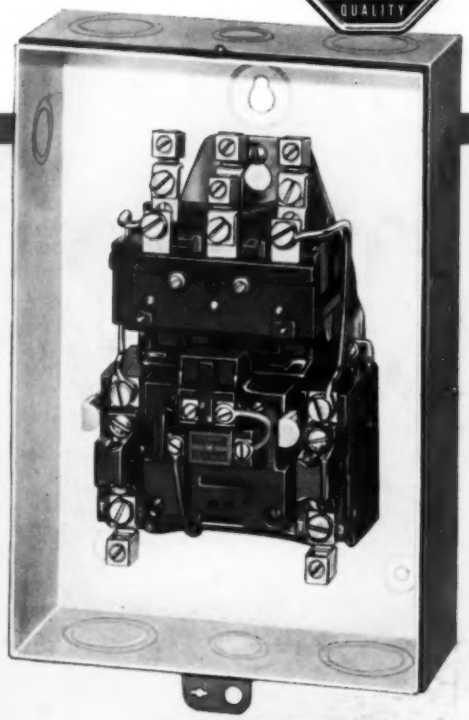
A-B QUALITY

Pygmies in Size
Giants in Performance—
the NEW Allen-Bradley Across-the-Line Starters!

This new line of across-the-line motor starters is the result of over 30 years of experience and leadership in the motor control field.

While retaining the simple solenoid principle—with only ONE moving part—these starters are completely new in every way. They are amazingly small in size—yet test after test has proved they will not only outperform but also outlast any starter now on the market. They are good for *many millions* of trouble free operations. All have scores of design refinements that make them easier to install and maintain. All are available in the smart new enclosures designed by Brooks Stevens. They make a beautiful addition to any machine or control installation.

You'll want to get the complete story about these truly revolutionary new across-the-line starters. Write for new Publication 6100.



BULLETIN 709

This popular across-the-line solenoid starter shows the new Size 2 construction. Note the white interior and generous wiring space. Bulletin 709 starters are available, in the new construction, in seven sizes—Sizes 00 to 5, with a maximum rating of 100 hp, 220 v; 200 hp, 440-550 v.

11-61-RM

ALLEN-BRADLEY

Member of NEMA

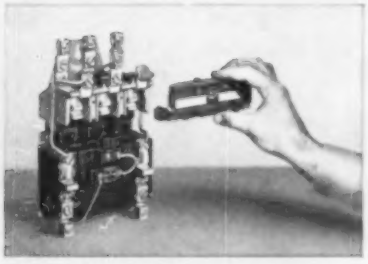
Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.

QUALITY MOTOR CONTROL

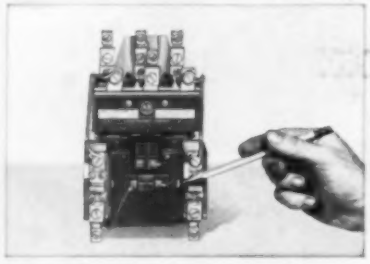
Features of the NEW Allen-Bradley starter line that are of value to you!

New Bulletin 709 Size 3 across-the-line motor starter. Note the generous space for wiring, accessible terminals, and white interior.

Every detail of the new Allen-Bradley motor starters has been designed to help make this the best line of motor control on the market. Remarkably small in size, each starter is a giant in performance. Being light in weight, these starters are easy to handle and a cinch to install. The generous wiring space, full front wiring, white interiors, and convenient knockouts make installation easy. The enclosure cover is firmly held with a quarter-turn fastener. All installation, inspection, and maintenance operations can be handled from the front—as shown in the illustrations below—without the use of special tools.

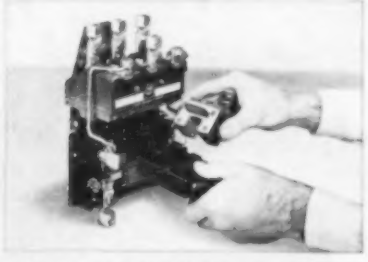


QUICK, EASY CONTACT INSPECTION—When the arc hood front cover is removed by loosening two captive screws, contacts are plainly visible from the front.



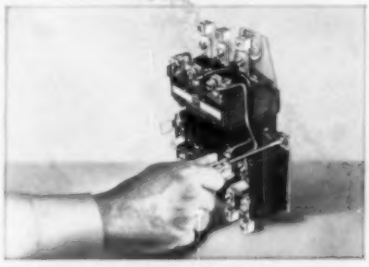
CONTACT POSITION INDICATED—Two slots in the coil cover show the position of the movable contact support—tell whether contacts are "closed" or "open."

CONTACTS EASILY REPLACED—Depress the spring slightly, and the movable contacts can be lifted out of the molded support and the new contacts slipped in.



COIL EASILY CHANGED—When the coil cover is removed, coil and magnet yoke can be lifted out from the front. They are impossible to replace incorrectly.

AUXILIARY CONTACTS EASILY ADDED to the front of the starter. Two extra auxiliaries can be added to Sizes 0, 1, and 2 starters, and four, to Sizes 3, 4, and 5.



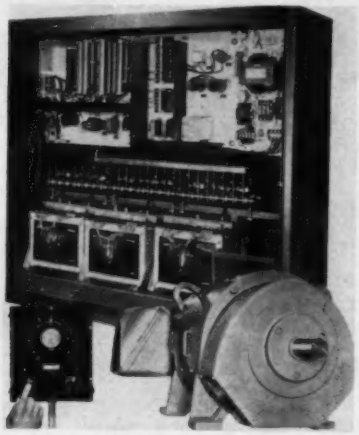
A THIRD OVERLOAD RELAY CAN BE EASILY ADDED in the field, from the front of the starter. And the only tool needed is a common screwdriver.

ALLEN-BRADLEY

Member of NEMA

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.

QUALITY MOTOR CONTROL



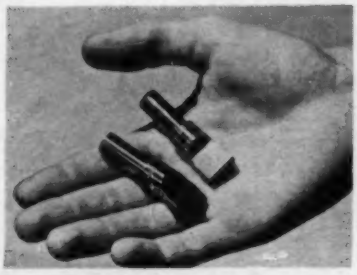
Static-Powered Speed Drive Available From 1 to 200 hp

V-S Statatron is a static-powered drive for wide range variable speed from inplant ac circuits. It uses silicon diodes and saturable reactors to rectify the current from ac to controllable dc. They work in combination with the transistorized power exciter to supply variable voltage.

It consists of only three basic components: the Super T dc motor; the operator's station; and the Statatron control cabinet. Use of a static power supply reduces the overall size of the control unit; in some sizes the V-S is 35% smaller than other conventional units. Elimination of a motor-generator set provides additional savings in maintenance cost. Static drive offers vibrationless operation of the control unit because there is no rotating power unit. Dynamic braking gives smooth stops.

Reliance Electric & Engrg Co, 24701 Euclid Ave, Cleveland 17, Ohio

MORE DATA? Circle 71, inside back cover



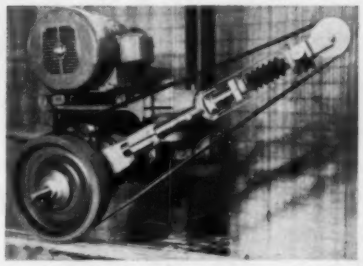
Block Diamond Wheel Dresser Handles Wheels to 48-in. Dia

Design incorporates 150 octahedrons set in tungsten powders for tough gripping action around stones. Face measures ¼ x ⅝ in. and 7/16 in. deep with alternate layers of 21 and 22 diamonds.

Tool, which can dress wheels from 12 to 48 in. in dia, can be purchased in either a straight or 15° shank. Guaranteed to outwear a 2-carat diamond wheel dresser, it can be used on machines for every type of grinding, dry or wet. Price of the tungsten tool is $44.50.

Lazzara Co, 112 Meyerland Plaza, Houston 35, Texas

MORE DATA? Circle 72, inside back cover



Arm Attachment for Buffing Lathe Permits Abrasive Belt Polishing

Abrasive belt arm attachment that can be easily installed on adjustable buffing lathes of various makes provides an economical means of adding abrasive belt polishing operations to existing equipment.

The lightweight attachment is easily mounted on the spindle housing of the lathes. Belts are spring loaded between a contact wheel and an idler pulley. Spring-loaded lever permits rapid belt changing; tracking is achieved through an adjustable mechanical device. Various standard units will handle belts from 2 up to 8 in. in width and 96 up to 132 in. long.

Acme Mfg Co, 1400 E Nine Mile Rd, Detroit 20, Mich

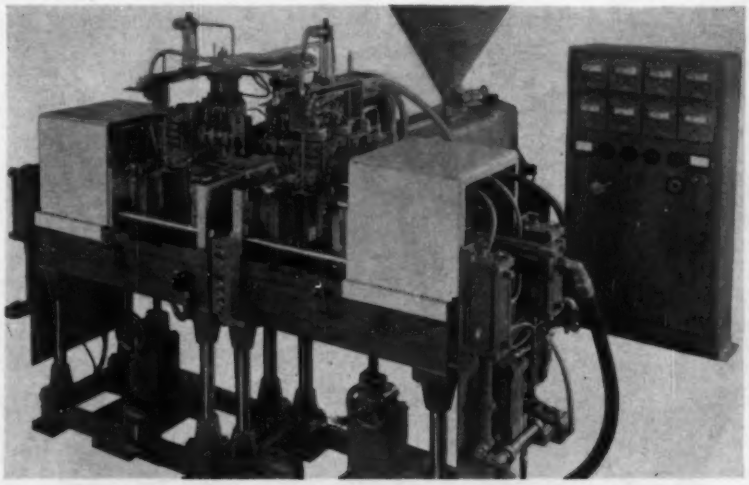
MORE DATA? Circle 73, inside back cover

Heavy-Duty Drills Offered for High Tensile Alloys and Steels

Line of solid carbide Hi-Ten drills, Series 1806 for heavy-duty drilling, is available from stock as standards in 29 fractional sizes graduated in 1/64ths from 1/16 to 1/2 in. They are recommended for drilling hardened steel up to Rh 65C and for production applications on exotic metals, high tensile and high temperature alloys through Rh 56C. Drills have straight shanks, two straight flutes, and are RH cutting. Generous standard blank allows heavy-duty drilling with excellent chip clearance characteristics.

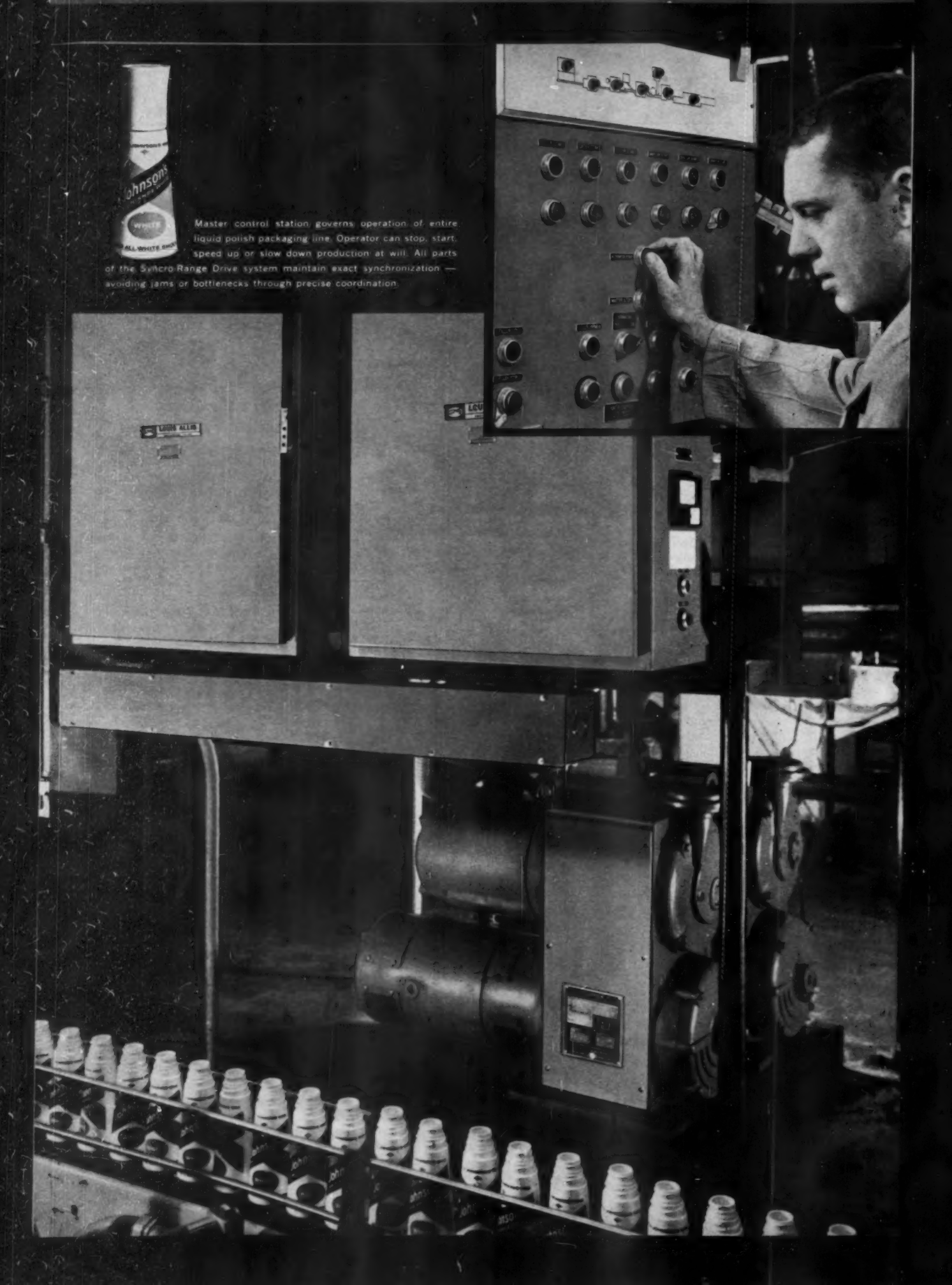
Atrax Co, Newington, Conn

MORE DATA? Circle 74, inside back cover



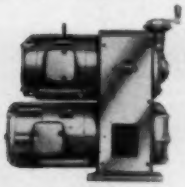
VERSA-BLOW SERIES OF BLOW MOLDING MACHINES have modular building-block construction to allow easy adaptation to specific needs. The ten different models, combining 1, 2, and 4 parison heads, feature 3-way micro-positioning adjustments; high-speed equalized opening and closing; high-speed horizontal in-line accumulator; 3 separate adjustments to regulate parison weight, concentricity, and straightness; adjustable platen daylight opening—*Plastics Machinery Div, The Producto Machine Co, 990 Housatonic Ave, Bridgeport 1, Conn* •

MORE DATA? Circle 75, inside back cover

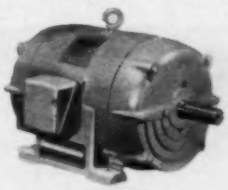


Master control station governs operation of entire liquid polish packaging line. Operator can stop, start, speed up or slow down production at will. All parts of the Syncro-Range Drive system maintain exact synchronization — avoiding jams or bottlenecks through precise coordination.

The key components of the Syncro-Range Drive...



Adjustable Frequency Power Supply . . .



. . . and Standard or Syncro-Spede Motors!

LOUIS ALLIS SYNCRO-RANGE DRIVES automate liquid polish lines

Johnson's Wax, renowned wax and polish producer, uses Syncro-Range Drives for exact control of process lines

Controlling speed of the precise, mass-production lines for their new, highly successful liquid shoe polish was the task Louis Allis engineers had to solve for Johnson's Wax.

The problem was to time the flow of plastic bottles, liquid polish, wool daubers, and caps into the packaging lines at precisely equal rates. Flow rate must be adjustable so the lines can be slowed down or speeded up. And the entire packaging operation must be controllable from a single master control. The Louis Allis Syncro-Range Drive solved the problem.

Syncro-Range Drives provide synchronized speed of any number of motors from a single control. It is a "packaged system" comprising an adjustable-frequency power supply operating on 3 phase, 60 cycle power input . . . a group of Syncro-Spede® synchronous motors which maintain exact synchronism regardless of varying load . . . and a control which permits the speed of the entire group of motors to be simply adjusted without losing synchronization. On applications for which exact synchronism is not required, standard squirrel-cage motors can be supplied.

You can readily see the advantages of the Syncro-Range Drive in systems or processes which require synchronized movement: multiple conveyors which feed consecutively; transfer lines; process lines; assembly lines requiring coordinated arrival of components; printing where one press feeds another; synthetic fibre spinning, drawing, or twisting; metal runout tables; and many other similar continuous-process machines which require the application of power at a number of points on the machine.

The Syncro-Range Drive is available with a choice of drive sizes to efficiently control from 2 to 200 (or more!) standard or Syncro-Spede motors of the same or different horsepower ratings. The Syncro-Spede motor is an A-C synchronous induction motor without slip rings or D-C excitation. It requires no more upkeep than a standard, squirrel-cage motor and can be supplied in open drip-proof, enclosed, or explosion-proof enclosures with mechanical modifications to match your requirements.

A sophisticated selection of control features are available in the system, including motor starters, main line circuit breaker or fusible disconnect switch, speed adjustment, speed indicator, remote control, and automatic control governed by temperature, pressure, or flow sensing devices. Controls can provide speed regulation accurate to 0.1% with 0% relative speed difference between motors!

Investigate the application of the Syncro-Range Drive system to *your* process. A trained Louis Allis motor application engineer is always available. You can reach him at your local Louis Allis District Office, or by writing direct to The Louis Allis Company, 452 East Stewart Street, Milwaukee 1, Wisconsin.

MANUFACTURER OF ELECTRIC MOTORS AND ADJUSTABLE SPEED DRIVES

LOUIS ALLIS

ASD-251

CIRCLE 307 READER SERVICE CARD

AUTOMATIC CHUCKING MACHINE

There are no half-finished pieces lying around at the end of the day when you put your work on this outstanding machine.

The "1-2-3" feature—available only on the Goss & De Leeuw Automatic Chucker —provides the means of finish machining three ends of a part without changing set-up.

Note some of the typical parts machined. Ask for illustrated literature giving further details and send samples of your work for a cost estimate on handling it on the Goss & De Leeuw.

GOSS & DeLEEUW
QUALITY PRODUCT-QUANTITY

GOSS and DE LEEUW
MACHINE COMPANY, KENSINGTON, CONN., U.S.A.

Field Report

McKay Machine Schedules $4.5 Million Expansion

New plant and general office building will be constructed later this year by McKay Machine Co of Youngstown, Ohio. Combined machine shop and assembly plant, covering 145,000 sq ft, and a three-story general office building will go up on a 34½-acre site in an industrial park on the western edge of the city. The project is estimated to cost approximately $4.5 million and will include a $1 million expenditure for new machinery for the planned facility plus improvements at the plants in Warren, Ohio, and Danville, Ill.

McKay presently employs 1200 in the design and manufacture of metal processing, forming, and fabricating machinery. It recently merged with Federal Machine & Welder Co, Warren, which became its Federal-Warco Division. It also operates a subsidiary, Berkeley-Davis, in Danville.

International Harvester Orders

Two contract awards for trucks, amounting to more than $38 million, have been received by International Harvester Co of Chicago from the US government. Production will be carried out at the Springfield, Ohio, plant and at the Fort Wayne works, where an additional 300 workers will be employed.

Chevrolet Will Spend . . .

. . . $4.3 million in equipping and refurbishing the huge former aviation-engine plant in Tonawanda, NY, that it acquired from the government last year. The program is expected to create an estimated 600 new jobs. The money will be spent during the next five years for new machines, equipment, and conversion of the present electrical system in the plant.

30 Firms to Join Apollo Study

Martin Co has chosen 30 companies to assist in its study contract to develop designs for the Apollo moon-orbiting space project. The firms were selected from more than 300 which had offered their services in the study free of charge. Many fall into the category of small business. The companies will engage in studies in the fields of vehicle propulsion, guidance, recovery, tracking and telemetry, and environment control.

Project Apollo will provide manned reconnaissance flights around

the moon and eventually manned lunar landings and exploration of the solar system. It's been given a major role in NASA's space flight program for the 1960's.

Bell Helicopter Contract

A $4 million order from the Australian government has been received by Bell, Fort Worth, Texas, for an undisclosed number of its Iroquois model. Australian order is the first for export sales of the Iroquois. No immediate increase of Bell's personnel is scheduled.

Tokyo Machine Tool Builder Studying American Market

Tsugami Manufacturing Co, one of Japan's largest manufacturers of machine tools, has retained the marketing and management consulting firm of Ward J Jenssen Inc, Los Angeles, to study the American market for Japanese machine tools. Reported to be the first marketing study of its kind undertaken by an American firm, it'll determine the extent and nature of the US potential market for Japanese imports of heavy production machinery. The nationwide research study will require about four months for completion.

Royal Industries Gets New Orders

New orders amounting to more than $4.1 million have been received by Royal Industries of Los Angeles, designer and manufacturer of precision equipment for the nuclear and aerospace industries. Work involves instrumentation, specialized containers, and nuclear programs. Company's Ideal-Aerosmith Division at Cheyenne, Wyo, set a record for new business for the first quarter of this year, according to company President J R Johnson. •

AM/MM

"He was experimenting—wanted to see if his finger would fit in a fire hose."

rebuilt, retooled

PRECISION BORING EQUIPMENT... with a new machine guarantee

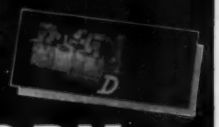
precision boring equipment by America's greatest names...

Here's a money-saving way to handle every precision boring problem—no matter what. We'll take your present machinery or basic equipment . . . completely retool and rebuild it to your specifications . . . install it in your plant under the supervision of one of our service engineers, if you so desire . . . and back up our work with a NEW machine guarantee.

It's quite possible that we already have the machine you need in our present inventory of rebuilt, retooled machines that bear America's greatest names.

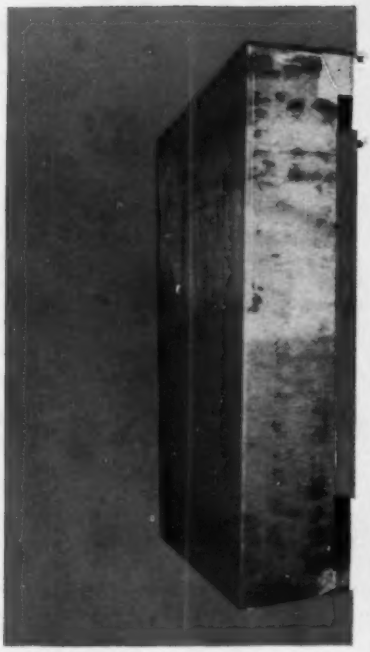
No matter which you choose—whether from our inventory or starting with your machinery, we'll accept complete responsibility for your precision boring problem.

Write for complete money-saving details with an up-to-date list of our current inventories.



DEARBORN
MACHINE TOOL DIVISION

DEARBORN TOOL AND DIE COMPANY
10200 Ford Road, Dearborn, Michigan • LU. 2-3636

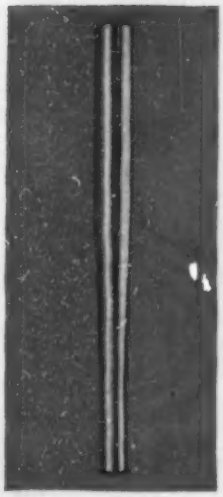


How METALOGICS* cools off the high-cost hot seat!

The following case histories are typical of how Ryerson Metalogics helps hundreds of companies save money, improve products, and cut production waste.

Metalogics-trained Ryerson specialists help you value-analyze cost-soaring production problems—and they back up their suggestions with unbiased recommendations on exactly the right steel, aluminum or plastic to do each job best for less.

Little wonder, then, that more and more companies across the country find the high-cost hot seat a little cooler after inviting a Ryerson man to value-analyze specific problems, and come up with recommendations. Give him a call—perhaps he can help answer some of your high-cost questions.



*METALOGICS—the Ryerson science of giving optimum value for every purchasing dollar.

PRODUCTION COSTS REDUCED 40%

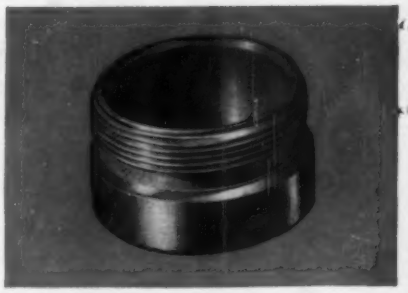
Company was making chrome-plated table legs as a 3-piece weldment and having problems in holding concentricity and making proper preparation for the mirror finish. In addition, production costs were high.

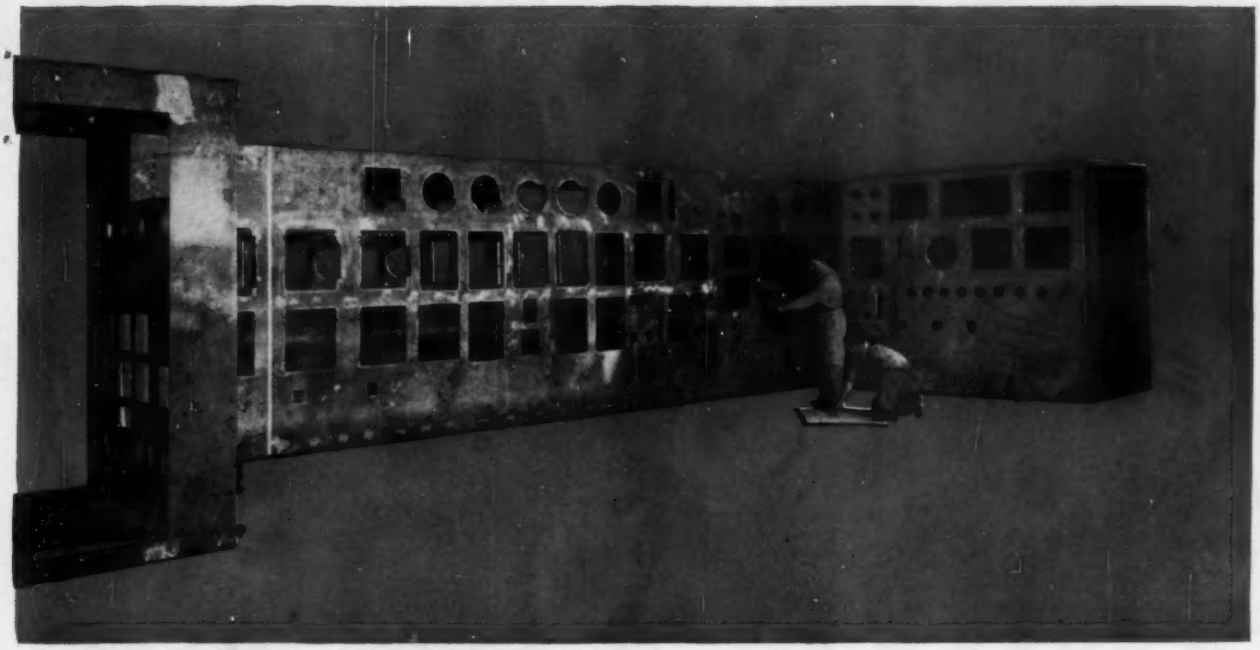
Ryerson recommended this Metalogical solution: make the legs from *one* piece of 3″ O.D. soft-annealed, cold rolled, electric-welded tubing—half the length tapered to 2″ O.D., holding concentricity to 1/32″. Results: surface was just right for chrome plating, and production cost reduced.

THREAD GALLING ELIMINATED

Manufacturer made this special coupling of aluminum to gain the advantages of light weight, corrosion resistance and easy machining. But a problem developed due to galling of threads.

Following the recommendation of a Ryerson Metalogics specialist, the company hard-coated the parts by special low-temperature anodizing which produced a surface hardness of Rockwell 70 C. Galling was eliminated, and corrosion resistance increased. One more example of top technical help from Ryerson.

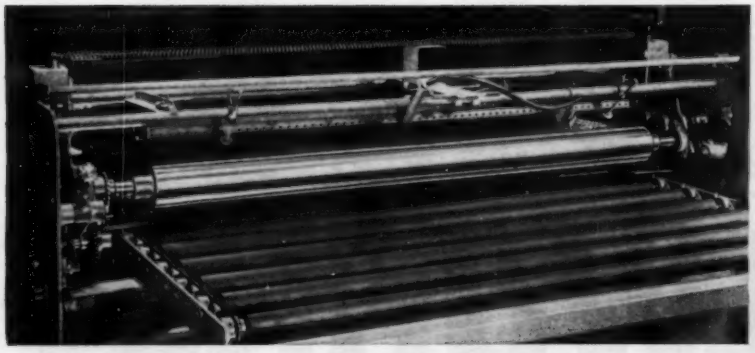




150 OPENINGS BURNED IN HUGE CONTROL PANEL ASSEMBLY

Expert Ryerson flame-cutters burned more than 150 openings in the steel plates that make up this huge control panel assembly.

Each opening had to be located and cut with extreme accuracy to permit proper installation of the complex instrument system. Distortion had to be carefully controlled and a high degree of flatness maintained so that the plates would have a good appearance when painted. All such requirements were readily met by Metalogically-oriented Ryerson service.



One end of close-tolerance roll. Note 3-step machining of bar.

SWITCH TO LEDLOY® STOPS TEARING...CUTS REJECTS

In making this roller coater—Gasway Corp., Chicago—was having trouble machining C-1018 bar stock to produce a close-tolerance roll. Three-step machining was required at both ends of the bar, and tearing was frequent with up to five stops per cut to regrind the tool.

After studying the problem carefully, their Ryerson specialist recommended a change to Ledloy 300. Results from this fast-machining leaded steel: higher production; longer tool life; rejects cut to a minimum.

Other steels for this coater, including angles, expanded metal, and cut-to-size side plates, are also supplied by Ryerson.

As P. A. Bill Vastine puts it, "Time and time again Metalogics takes me off the spot. It gives me technical help, plus convenient, dependable, single-source service on all my requirements."

RYERSON METALOGICS

JOSEPH T. RYERSON & SON, INC., MEMBER OF THE STEEL FAMILY

STEEL · ALUMINUM · PLASTICS · METALWORKING MACHINERY

COMPARE EDIT AUTHORITY AND YOU'LL CONCLUDE THIS IS METALWORKIN MOST POWERF SELLING TOOL

ORIAL

G'S

UL

In metalworking—men who matter read...

American Machinist / Metalworking Manufacturing

A McGraw-Hill Publication, 330 West 42nd Street, New York 36, N. Y.

AM/MM is edited exclusively for men who make things of metal—whether it's a Diesel locomotive or the delicate balance wheel of a watch—men who have a community of interest in the methods, techniques, tools, machines and materials of metalworking.

It's a technical publication for technical men—a work book that shows its readers how to manage metalworking operations and manufacture things from metal more efficiently, more profitably.

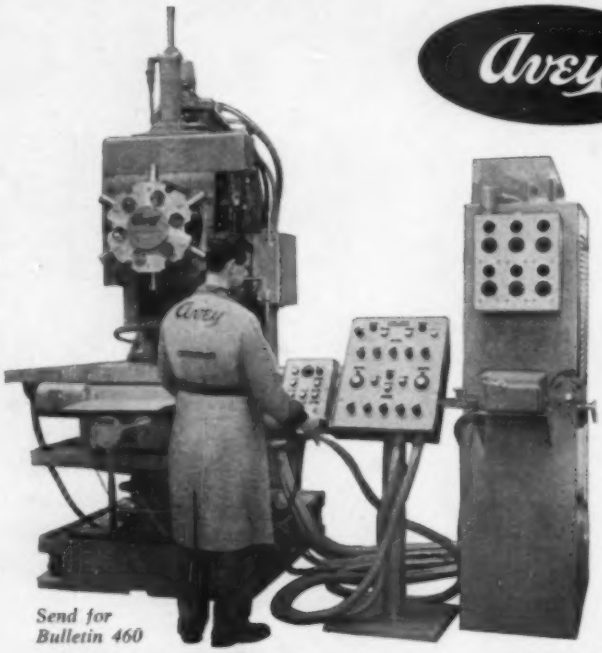
When a man reads American Machinist/Metalworking Manufacturing, we guarantee he will not be left uninformed about any phase of metalworking—a policy that has earned us an all-paid circulation (ABC-audited) of top manufacturing managers, engineers and plant managers in the eight basic SIC classifications that make up metalworking.

Analyze the how-to articles on technology and management techniques, the case histories and working information in any issue, and you, too, will conclude that AM/MM is metalworking's most powerful selling tool.

For up-to-date facts and figures on metalworking, ask your AM/MM district manager for a copy of the 1960 Market Guide for Sales Executives.

6 precision spindles by

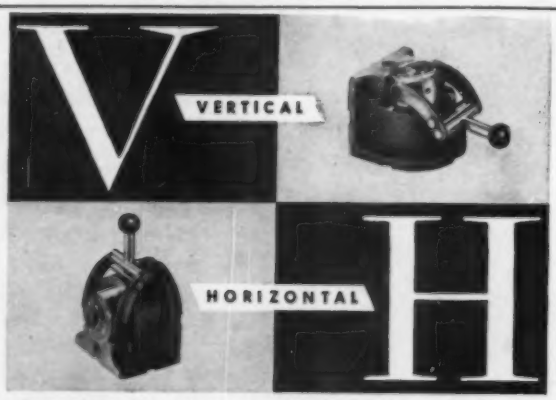
Avey



Send for Bulletin 460

You can get this rugged Avey 250 Turret-Dex with either automatic or numerical controls. Rotary, 2- or 3-axis positioning. Pre-selected speeds, feeds, rapid advance, tapping cycles. Automatic depth control all spindles; automatic turret clamp; positive spindle stop; skip index. Capacity to 1¼". Eight spindles optional. Avey, Box 1264, Cincinnati 1, Ohio.

CIRCLE 314 READER SERVICE CARD



Another Model Holding Fixture by ZAGAR

Simplified tooling at reduced cost keynotes Zagar fixtures for drilling, grinding, milling and other finishing operations. The Zagar V-H will:

- SET UP QUICK
- LOAD EASILY
- ELIMINATE NEED OF ANGLE PLATE

Get more information in Reference Sheet 14-A-5.

ZAGAR, INCORPORATED

Zagar

23886 LAKELAND BLVD.
CLEVELAND 23, OHIO

TOOLS FOR INDUSTRY and SPECIAL MACHINERY

Free Literature

To order any of these bulletins, circle corresponding number inside back cover.

MACHINES AND ATTACHMENTS

1 SMALL HEAVY-DUTY LATHES—*R K LeBlond Machine Tool Co, Madison at Edwards Rd, Cincinnati 8, Ohio.* 16-page illustrated bulletin HD-1016 describes the NE design 20-hp heavy duties available in four sizes which provide from 17½ to 25-in. swing over the beds. They offer 27 different spindle speeds and 60 thread changes. Specifications and descriptions of NE design toolroom and plain bed gap lathes are also included.

2 UNIVERSAL TURRET LATHE — *Warner & Swasey Co, 5701 Carnegie Ave, Cleveland 3, Ohio.* 8-page brochure covers design, specifications, and attachments for the No. 3 ram-type machine engineered to handle bar work up to 1½ in. in dia or chucking work with swings of up to 15⅝ in. Features described and illustrated include new hydraulic headstock with single lever pre-selector and speed control; centralized operating controls; hexagon turret unit; direct-mounted drive motors; and hydraulic collet chuck and bar feed.

3 OPENSIDE MILLING MACHINE—*G A Gray Co, 3611 Woodburn Ave, Cincinnati 7, Ohio.* 21-page bulletin 77 contains illustrated data on the Gray Handymill available in 30, 36, and 42-in. sizes. Features include non-metallic V table ways; helicone transmission; specially developed milling heads to which standard attachments may be added (any combination of rail and/or side heads is possible); eight spindle speeds from 67 to 652 rpm; new drive unit and gear ratio permit table and rail feeds of from 1 to 40 ipm over an infinite full range.

4 DUPLEX GRINDER—*Bryant Chucking Grinder Co, Springfield, Vt.* 4-page illustrated folder gives specifications and details on new double-end internal grinder designed for grinding both a straight and a tapered bore at a single chucking. Includes detailed descriptions of machine movements, a schematic, close-up of tooling area, and complete operating specifications.

TOOLS AND ACCESSORIES

5 INVOLUTE CHECKER — *Michigan Tool Co, 7171 E. McNichols Rd, Detroit 12, Mich.* Technical Data Sheet 1124-61 describes the Sine-Line Model 1124 which includes optical setting of the sine bar so accuracy of the instrument is independent of operator feel. Angles can be set within 0.001 in. without the use of gage blocks. Optical system has been designed as an attachment so that it can be used with Models 1124 and 1124-C already in use.

6 STRIPPIT SYSTEM—*Wales Strippit Inc, Akron, NY.* 16-page general catalog describes development of the system and its components for punching, notching, nibbling, and drilling. Complete details on the various types of units are included in specific bulletins indicated in description of units in this catalog.

7 SPEED MEASUREMENT SYSTEMS —*General Electric Co, Schenectady 5, NY.* 12-page bulletin GEZ-3251 describes complete line of ac and dc tachometer generators and indicators. Relates information on instruments' applications, calibration, accuracy, and method of selection. Includes specifications schematics, and photos of systems.

8 ELECTRIC EYES—*Photomation Inc, 98 S Washington Ave, Bergenfield, NJ.* 22-page bulletin 611 covers all phases of electric eye applications in automation.

Illustrations and schematics show mechanical characteristics of diversified photoelectric systems ranging from miniaturized light sources and photo units to time delays.

HEAT TREATING AND WELDING

9 HARDFACING ELECTRODES AND WIRES—*Air Reduction Sales Co, 150 East 42nd St, New York 17, NY.* 44-page brochure, form ADC 955, cross-referenced, has all hardfacing materials classified and illustrated according to use. Wear protection provided by Airco hardfacing alloys is discussed in detail; description of each electrode is presented along with application data. Over 100 specific equipment parts that benefit from hardfacing are listed together with the type of wear to which each is subject, and the alloy needed to protect it.

10 WELDING EQUIPMENT — *Modern Engineering Co, 3411 Pine Blvd, St Louis 3, Mo.* 24-page revised and illustrated pocket edition, catalog 170, covers Meco line of oxy-acetylene welding and cutting equipment and allied soldering-brazing equipment.

PLANT SERVICE EQUIPMENT

11 GAS-POWERED LIFT TRUCKS—*Automatic Transportation Co, 149 W 87th St, Chicago 20, Ill.* 16-page booklet discusses the flexibility of gas power plus the efficiency of electric drive offered in the GLF series. Application photos of both standard GLF trucks and specials with attachments point out how typical loads are handled in a wide variety of industries. Basic specifications shown for 13 standard models.

12 STEEL STORAGE EQUIPMENT — *Alan Wood Steel Co, Penco Division, 200 Brower Ave, Oaks, Pa.* 16-page booklet contains illustrated information on extensive line of steel shelving, lockers, cabinets, service counters, and bins engineered to save space, control inventory, speed shipping, reduce production bottlenecks, damage, and excessive handling.

PARTS AND MATERIALS

13 TAPPING SCREW EVALUATION *Parker-Kalon, Clifton, NJ.* 20 x 18-in. value analysis chart is designed as an aid for tapping screw evaluation in inspection and production departments and may also be used to set up assembly performance criteria. Complete information is given on the various features of tapping screws with respect to their performance on an assembly line: concentricity of head, accuracy of slot, position and depth of Phillips Recess, thread formation, and screw hardness and functionability. This is done by illustrating what to look for, how to check and with what instruments, and why these features are important in terms of cost and efficiency.

14 VARIABLE SPEED DRIVES—*Sterling Electric Motors Inc, 5401 Telegraph Rd, Los Angeles 22, Calif.* 112-page catalog features lube-free integral and fractional horsepower drives. A number of integral and fractional modifications are illustrated including single, double, and triple reductions, as well as various horizontal and single and double worm assemblies. Price section covers 2:1 to 6:1 variations and maximum variations. Modifications and accessories, dimensions, and technical information included.

15 ELECTRO-MECHANICAL PARTS —*Sterling Instrument Division, Designatronics Inc, 5 Sintsink Dr, Port Washington, NY.* 552-page catalog 65 describing complete line of over 20,000 stock items, is divided into 67 product categories including speed reducers, magnetic clutches and brakes, differentials, electronic hardware, teflon terminals, and limit stops. Part numbers, OEM list prices, specifications included. ●

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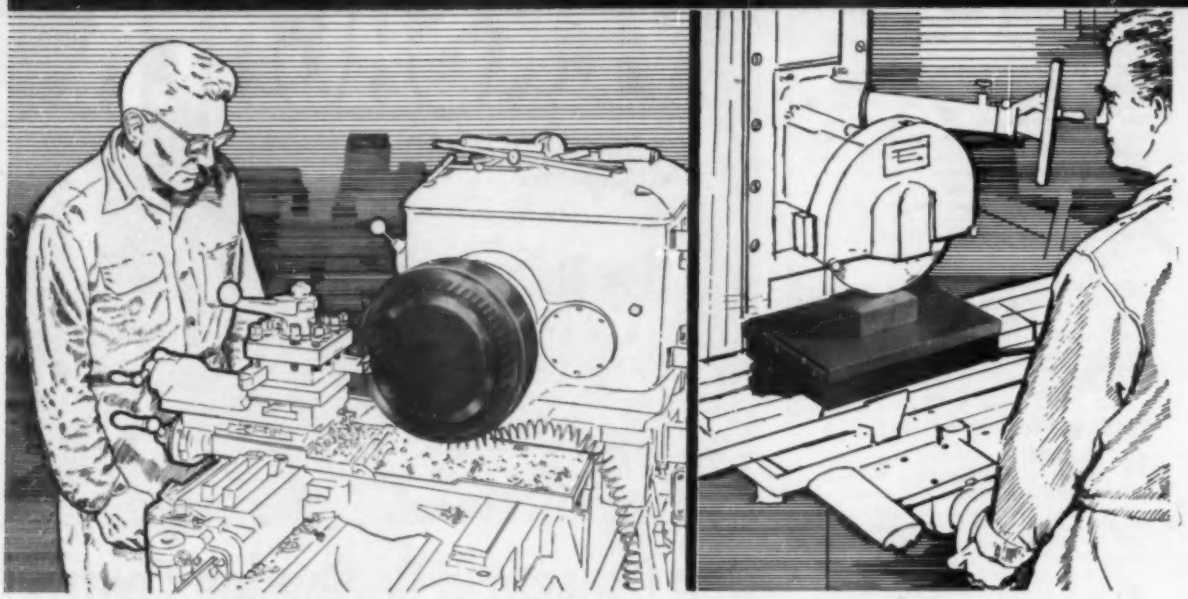
TP1-1

TAFT-PEIRCE GAGING

TAFT-PEIRCE MANUFACTURING CO.
13 MECHANIC AVENUE, WOONSOCKET, RHODE ISLAND

WALKER CERAMAX



TURNING

Walker, for the first time in machine tool history, offers safe magnetic holding for lathes. Ceramic magnets in Walker Rotary CERAMAX chucks are not subject to electrical power failure and have three times greater coercive force than ordinary Alnico magnets. With uniform holding power over the entire face of the chuck, safe, accurate turning, facing or trepanning is accomplished in a single set-up.

For dependable, trouble free operation specify Walker CERAMAX Chucks.

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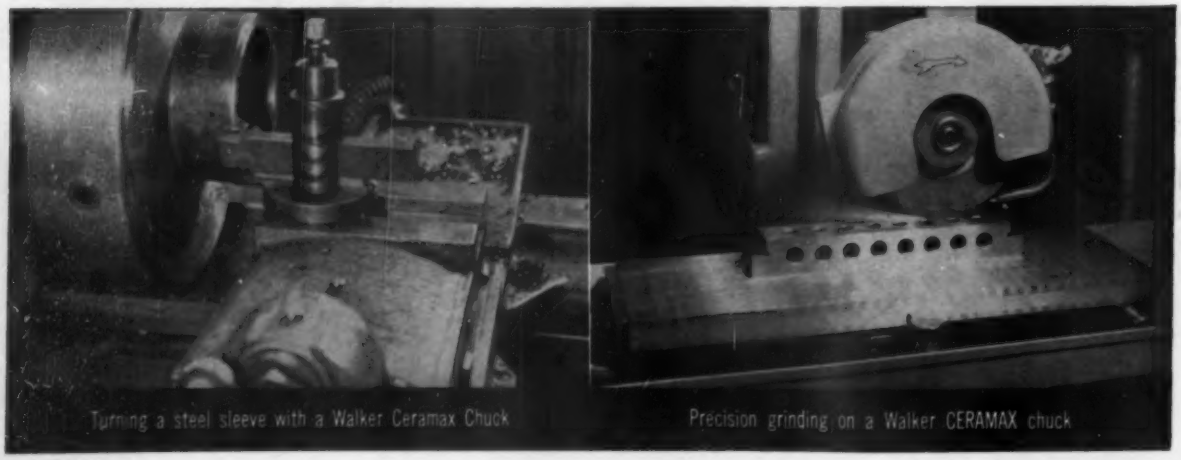
Walker CERAMAX chucks provide all the holding power needed for standard grinding operations and with fine pole divisions are ideal for thin, small work as well as large, heavy pieces. All-steel top plate minimizes redressing to reduce non-productive machine time. Ceramic magnets retain magnetism permanently, eliminate constant recharging.

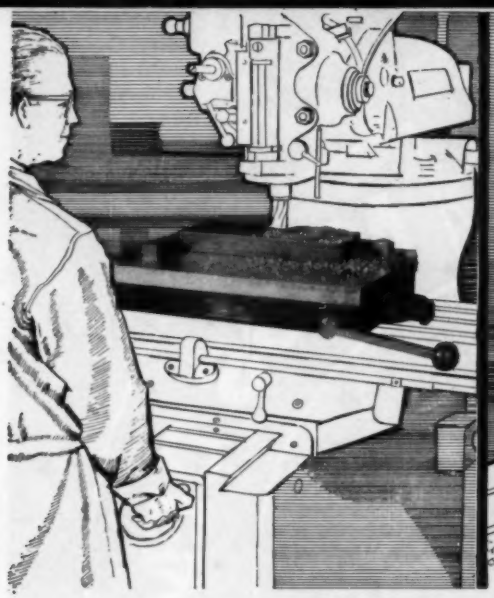
O.S. Walker Co., Inc.
ROCKDALE ST. • WORCESTER 6, MASS.
Original Designers and Builders of Magnetic Chucks

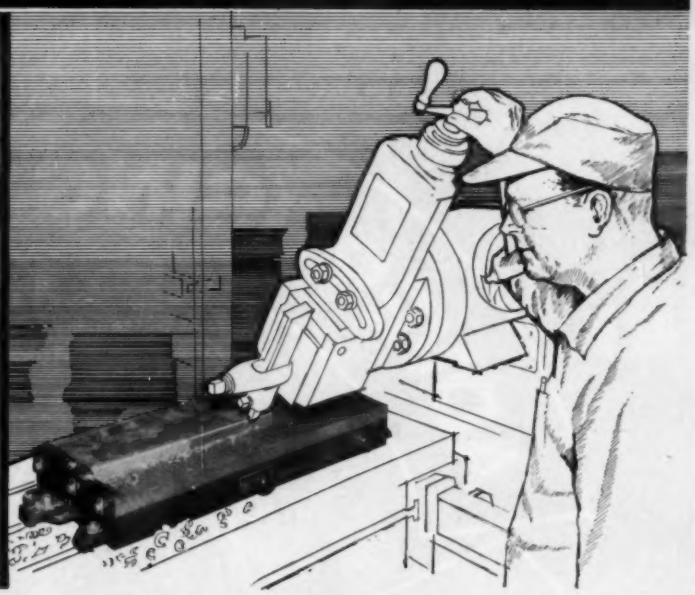


Turning a steel sleeve with a Walker Ceramax Chuck

Precision grinding on a Walker CERAMAX chuck

MAGNETIC CHUCKS





MILLING

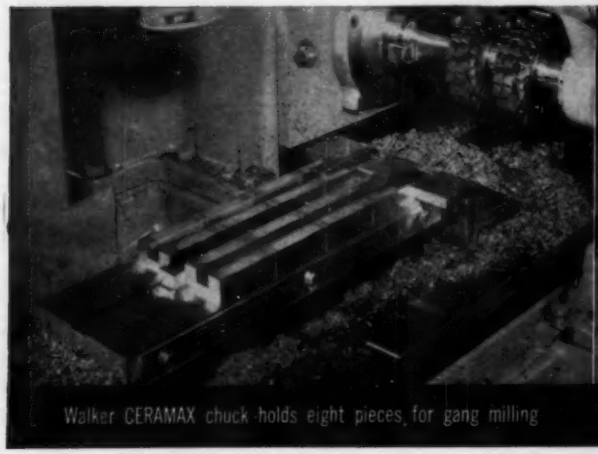
Walker CERAMAX Chucks eliminate tedious clamping in many milling operations. Only an auxiliary end stop to take the thrust on the table is needed for extra heavy cuts. Power-packed ceramic magnets individually magnetize each pole. Focused flux keeps the magnetic force down near the top plate and away from the spindle. Controlled magnetism from alternating north and south poles actually exerts a demagnetizing influence on the cutter. Tools remain chip-free.

SHAPING

Walker CERAMAX Chucks reduce machine down time and speed production in many shaping, profiling, broaching and planing operations. Extraordinary resistance to sliding force results from coercive force exerted by the fine pole divisions of permanent ceramic magnet chucks.

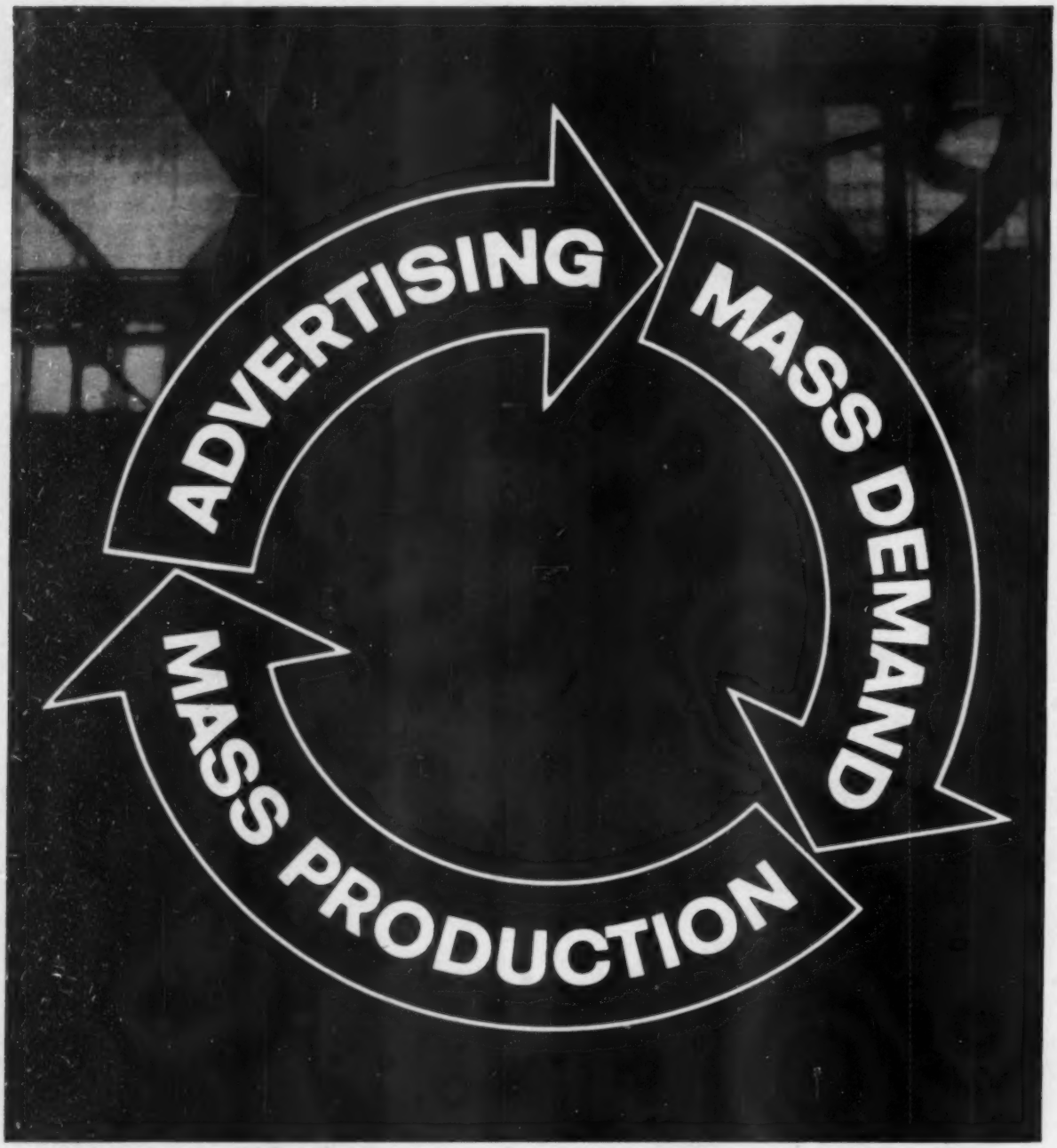
Check your plant for the many cost saving applications possible with Walker CERAMAX chucks.

O.S. Walker Co., Inc.
ROCKDALE ST. • WORCESTER 6, MASS.
Original Designers and Builders of Magnetic Chucks



Walker CERAMAX chuck holds eight pieces for gang milling

A Walker Ceramax Chuck holds steel pieces during shaping operation



Let's Keep Rolling Ahead

We Americans invented mass production, then we *had* to build mass demand to keep the wheels turning. For this purpose we called upon advertising – the most effective and economical means of creating mass demand. Soon we had more jobs, higher incomes, and better living conditions. And there isn't any limit to how much farther we can go, if we just keep it rolling!

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Listed below are used surplus new and rebuilt machine tools or services as advertised in this section.

The numbers after the advertiser's name indicates the products or services offered by the advertiser.

3. Automatics
7. Boring Mills
17. Drilling & Reaming Machines
20. Fabricating Equipment
24. Furnaces & Ovens
26. Grinding Machines
30. Keyseaters
31. Lathes
33. Machine Tools
37. Milling Machines
42. Planers
45. Press Brakes
46. Presses
53. Saws
56. Shapers
57. Shears

ADVERTISER	Page No.	KEY TO PRODUCTS OR SERVICES
Cook County Machinery Co.	118	20, 33
Eastern Machinery Co.	117	7, 26, 31, 37, 42, 56
Falk Machinery Co.	117	3, 7, 17, 26, 30, 31, 37, 46, 53
General Services Administration	118	24
Hill-Clarke Machinery Co.	118	42
Hyman & Sons, Joseph	118	45, 46, 57
Omark Industries	118	37
Wigglesworth Machinery Co.	118	46

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"No Cost or Obligation"

This service is aimed at helping you the reader of "SEARCHLIGHT," to locate rebuilt and used machine tools and equipment, not currently advertised. (This service is for USER-BUYERS only.) No charge or obligation.

How to use: Check the dealer ads to see if what you want is currently advertised. If not, send us the specifications of the equipment and/or components wanted on the coupon below, or on your own company letterhead to

SEARCHLIGHT EQUIPMENT LOCATING SERVICE
c/o American Machinist/Metalworking Manufacturing
Classified Advertising Division, P.O. Box 12, N. Y. 36, N. Y.

Your requirements will be brought promptly to the attention of the equipment dealers advertising in this section. You will receive replies directly from them.

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TITLE..... COMPANY.....

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5/29/61

EASTERN
Rebuilt Machine Tools
THE SIGN OF QUALITY
THE MARK OF DEPENDABILITY

Two (2) 100" Niles Vert. Boring Mills, good shape, very reasonable.
60"x60"x30' table Sellers Planer, four heads variable voltage, late.
28" Rockford Univ. Shaper, late good.
14"x102" Monarch Lathe, taper, extras.
Betts Combination Journal Truing and Axle Lathe, with gaps, late, good.
25"-40" and 20"-40" Nebel Gap Lathes, sliding bed and removable block types, 1950's.
24"x72" Landis Type F Plain Cyl. Grinder, extra heavy, latest model, 1955, never used.
60"x60"x30' table Sellers Planer, four heads, variable voltage, late, reasonable.
36" and 42" Bullards, raised column and five motor drive types, late, reasonable.
No. 2MI and No. 3 Cincinnati Dual Power Millers, 1951 machines, excellent condition.
16" wide, 30" under wheel, 48" table, Thompson Type C Surface Grinder, reasonable.
No. 4K Kearney and Trecker Plain Miller, 1945.
No. 18 Blanchard, 30" chuck, reasonable.
4'15" and 5'17" Fosdick Radials, reasonable.
22"x336" and 30"x60" Monarch Lathes, 16 speeds, reasonable.
27"x192" and 50"x60' LeBlond Lathes, heavy duty, late excellent condition.

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Every Item Guaranteed as Represented

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Drill: 2-spdl. No. 2LMS—26" LELAND-GIFF.
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Drill: 3' x 9" CINC-BICKFORD Radial.
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24", 36", 54" BULLARD Vert. Turret Lathes. Side Hd., Turret Hd., M.D., Spiral.

Lathes: No. 2, 4, 5, 1A, 2A WARNER & SWASEY, Preselector, Bar Feed & Chucking.
Lathes: No. 3, 7 BARDONS & OLIVER Turret.
Lathe: 20" x 16' AMERICAN Grd. Hd. MD.
Lathe: 24" x 28' HENDEY Grd. Hd. MD.
Lathe: 42" x 42' NILES G.H. 32' Centers.

No. 4 CINCINNATI Horiz. & #4 CINC. Vert. "DUAL POWER" Mills, 30 HP.

Mill: No. 24 KEARNEY & TRECKER Prod.
Mill: No. 2 BROWN & SHARPE Vert. M.D.
Mill: No. 3V VAN NORMAN Ram Type Vert.
Saw: 7" x 7" PEERLESS, Feed Table, 1951
Saw: No. 32C RACINE 10" x 16" Hyd.

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BECAUSE WE ARE NOW EXCLUSIVELY REPRESENTING NEW MACHINE TOOL LINES . . . WE ARE *CLOSING OUT* OUR USED AND RE-BUILT OPERATIONS.

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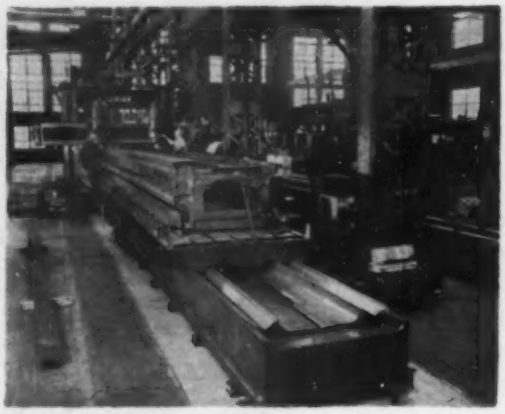
85" x 72" x 36' GRAY PLANER, 4 HEADS, MOTOR - GENERATOR SET, *PERFECT CONDITION*. USED EXCLUSIVELY ON MACHINE TOOL REBUILDING.

(WAS $54,000.00)
NOW $39,500.00



PHONE CRAWFORD 7-2000

HILL-CLARKE MACHINERY CO.

2106 S. KILBOURN AVE., CHICAGO 23, ILLINOIS

CIRCLE 603 READER SERVICE CARD

SEALED BID SALE
OF
USED ELECTRIC FURNACE

This sale consists of one (1) item as follows:

ELECTRIC FURNACE, air operated, single door, electric heated, conveyor resistance type. Model type 3614-54-E125.

Capacity: 1250° F, 135KW, 208V, 3ph.

Fan Motors: 220/440 volts, 1740 RPM, 5 H.P., 3 ph. Built in 1953. Serial No. 10859.

Mfr. Lindberg Engineering Co. Inside dimension 42" x 65" x 15". Total est. acq. cost: $31,857. Condition: Used.

Location: GSA Depot, Scotia, N. Y.

Inspection Dates: June 1 thru June 9, 1961 except Sat. & Sun. 8:30 A.M. to 4:00 P.M.

Bid Opening: 10:00 A.M., Tuesday, June 13, 1961 at the Bid Opening Room at the below listed office.

Bid Form No. GS2-USD-S-61-140 may be obtained at the inspection site or at the below listed office.

General Services Administration
250 Hudson Street
New York 13, N. Y.

CIRCLE 604 READER SERVICE CARD

IMMEDIATE DELIVERY

2—#5 MINSTER HIGH SPEED O.B.I. BLANKING PRESSES. 45 ton, Flywheel type, 1½" stroke, 5 HP Varidrives, Speed range 150-300 SPM. Equipped with #4-6 Perfecto Double Roll Feed and Scrap Cutter. Never used. PRICE: F.O.B. East Boston ..... $11,076.00 each

2—#6 MINSTER O.B.I. PRESSES, 60 ton Geared type, 7" stroke, 12" shutheight, 7½ HP Varidrives, 40-80 SPM. Never used. PRICE F.O.B. East Boston ..... $9500.00 each

WIGGLESWORTH MACHINERY COMPANY
60 Border St., East Boston, Mass.

CIRCLE 605 READER SERVICE CARD

FOR SALE BY ORIGINAL OWNER

Nineteen, Model A-25 Traub Automatic Screw Machines. Collet capacity 1". Spindle speeds 550 to 4000 rpm. Longitudinal turning length 3¼". 2 hp, 220 v., 3-phase. Bar stock feed, machine light. Average age, 5 years. Condition excellent. $1400 each at our plant.

One, Cincinnati Hydromatic Production Mill No. 324, (1940). Condition good. $2425 at our plant.

One, Cincinnati Hydromatic Traced Controlled Milling Machine, Model No. 34-36, (1941). Condition good. $2275 at our plant.

Direct inquiries to Purchasing Department

OMARK INDUSTRIES, INC.
9701 S.E. McLoughlin Bl'd., Portl'd. 22, Ore.
PR 5-4211

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Will Lease or Furnish Long Terms
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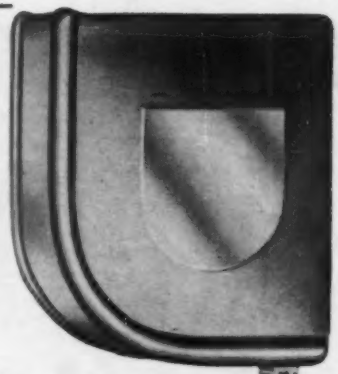

How Do You Measure Your Used Equipment Market? Searchlight... The accepted market place for the disposal of used and new surplus equipment. Buyers turn to it regularly. It makes sense for those who sell such equipment to advertise in:

SEARCHLIGHT SECTION

American Machinist | Metalworking Manufacturing

CLASSIFIED ADVERTISING DIVISION
POST OFFICE BOX 12
NEW YORK 36, N. Y.

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	Page
Air Express Div. R. E. A. Express	48
Allen-Bradley Company	101, 102
Allis Co, Louis	104-105
American Machinist/Metalworking Manufacturing	20, 110-111
American Sealants Co.	24
American Sip Corporation	3rd Cover
Armco Steel Corporation	96-97
Avey Division of Motch & Merryweather Co.	112
Bethlehem Steel Company	46
Bullard Company	40
Carpenter Steel Company	51
Cincinnati Milling Machine Co. Milling Machine Division	5, 6-7
Cleveland Crane & Engineering Co.	92
Cushman Chuck Company	33
Davis & Thompson Co.	120
Dearborn Machine Tool Div. Dearborn Tool & Die Co.	107
du Mont Corporation	32
European Exposition, 7th	77
Fellows Gear Shaper Company	8-9
Gisholt Machine Company	25-28
Goss & de Leeuw Machine Company	106
Grant Mfg. & Machine Company	119
Greenlee Brothers & Company	42
Hardinge Brothers, Inc.	12

(*Continued on page* 120)

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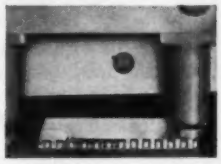

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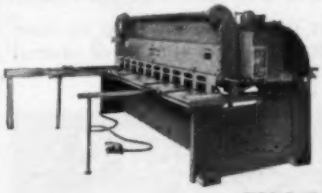

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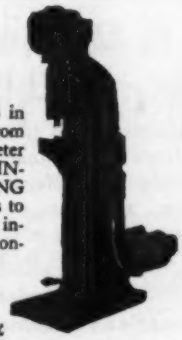

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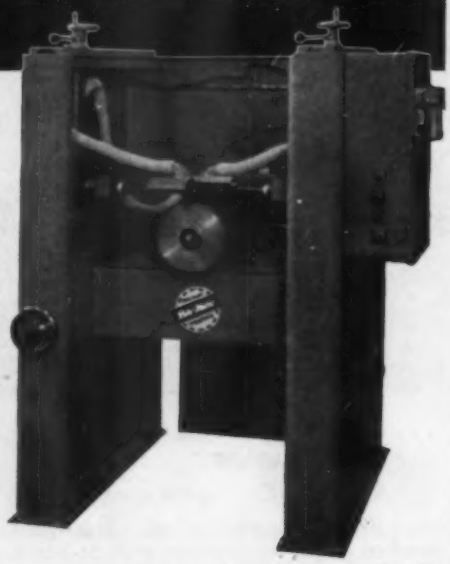

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INDEX TO ADVERTISERS

(*Continued from page* 119)

	Page
Heald Machine Co. Sub. Cincinnati Milling Machine Co.	2nd Cover
Howard International Inc.	121
Hughes Aircraft Co.	36
Johnson & Son, Inc., S. C.	54
Landis Tool Company	10-11, 13
Lapointe Machine Tool Company	22-23
Leland-Gifford Company	122
LIP Industries	121
Lodge & Shipley Company	119
Metallurgical Products Dept., General Electric Company	78-79
Monmouth County Planning Board	121
Morse Twist Drill & Machine Co.	44
New England Tap Co., Inc.	30
Norton Company	18-19
R.E.A. Express Air Express Division	48
Republic Steel Corp.	20-21
Ryerson & Son Inc., Joseph T.	108-109
SKF Industries Inc.	82
Sheffield Corporation of Bendix Corp.	31
Shell Oil Company	90
Simonds Abrasive Co.	52
Springfield Machine Tool Co.	80
Starrett Co., L. S.	84
Steelweld Machinery Division Cleveland Crane & Engineering Co.	92
Taft-Peirce Mfg. Company	113
Timken Roller Bearing Company Steel & Tube Div.	4th Cover

INDEX TO ADVERTISERS

	Page
Van Norman Machine Co. Div. Van Norman Industries Inc.	16-17
Walker Co., Inc., O. S.	114-115
Walker Turner Div. Rockwell Mfg. Co.	38
Warner & Swasey Co.	14-15
Westinghouse Electric Corp.	34-35
Zagar Inc.	112

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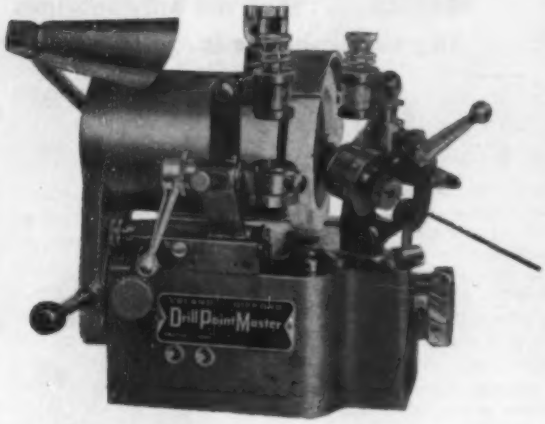

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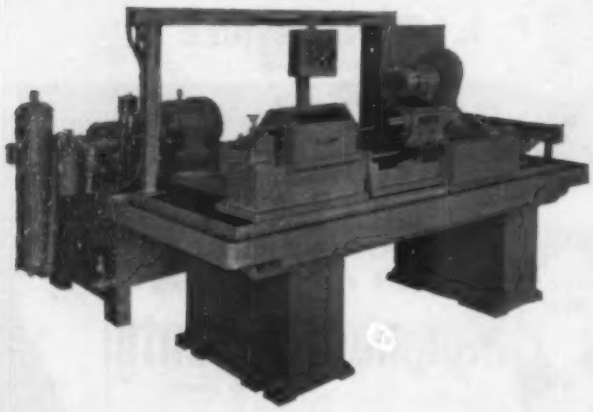

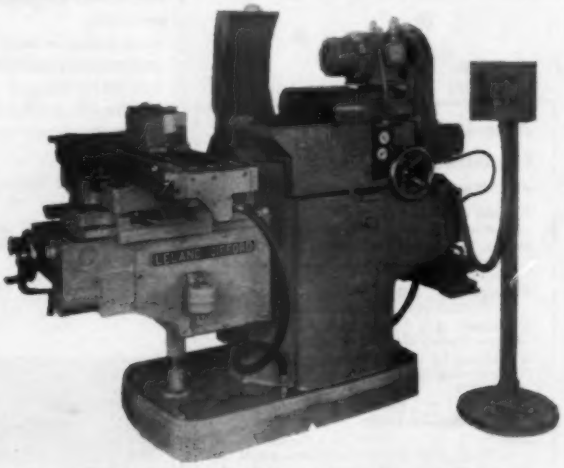

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104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124
125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145
146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166
167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187
188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208
209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229
230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250

ADVERTISEMENTS

251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271
272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292
293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313
314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334
335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355
356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376
377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397
398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418
419 520 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439
440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460
461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481
482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502
503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523
524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544
545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565
566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586
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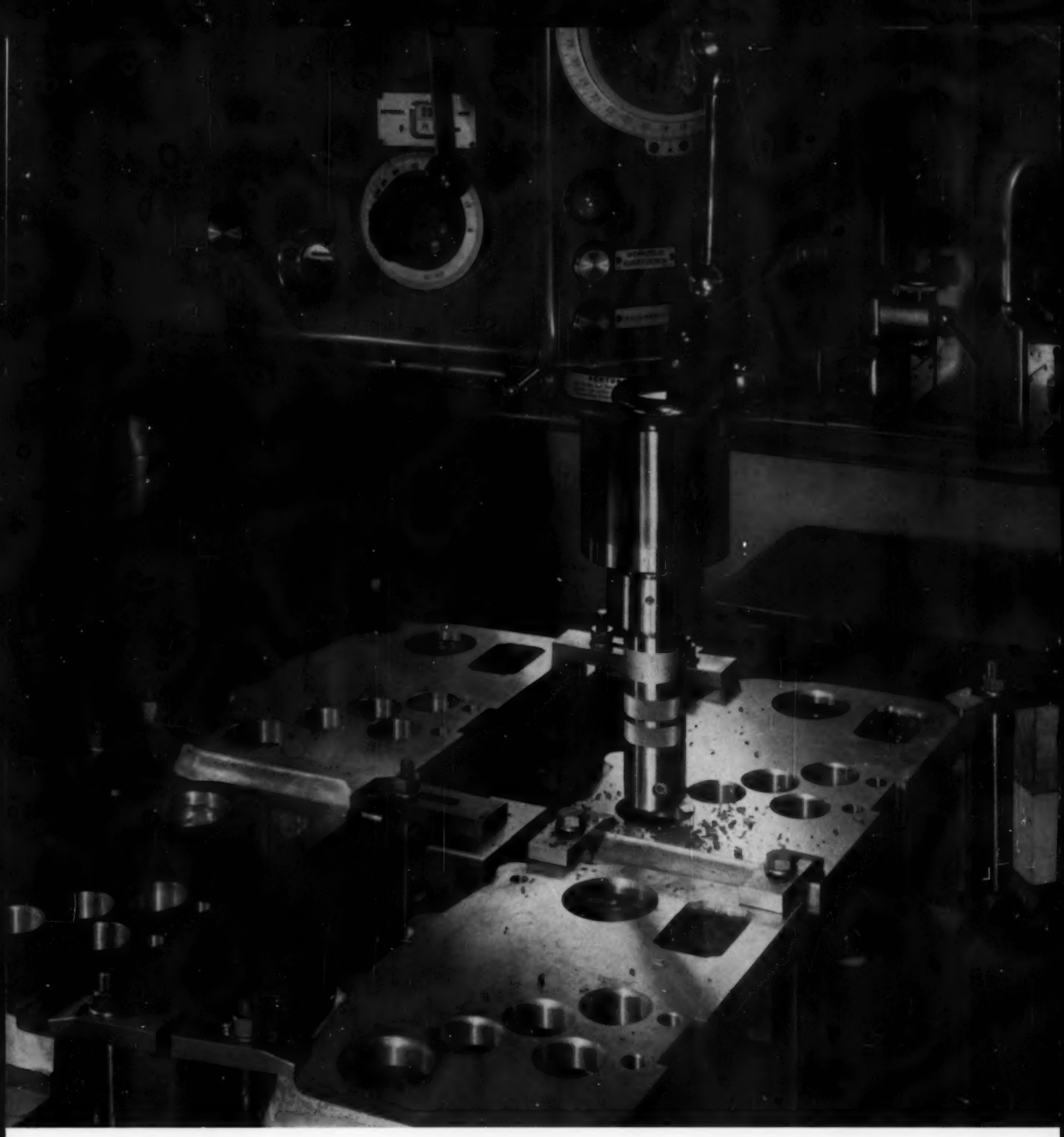

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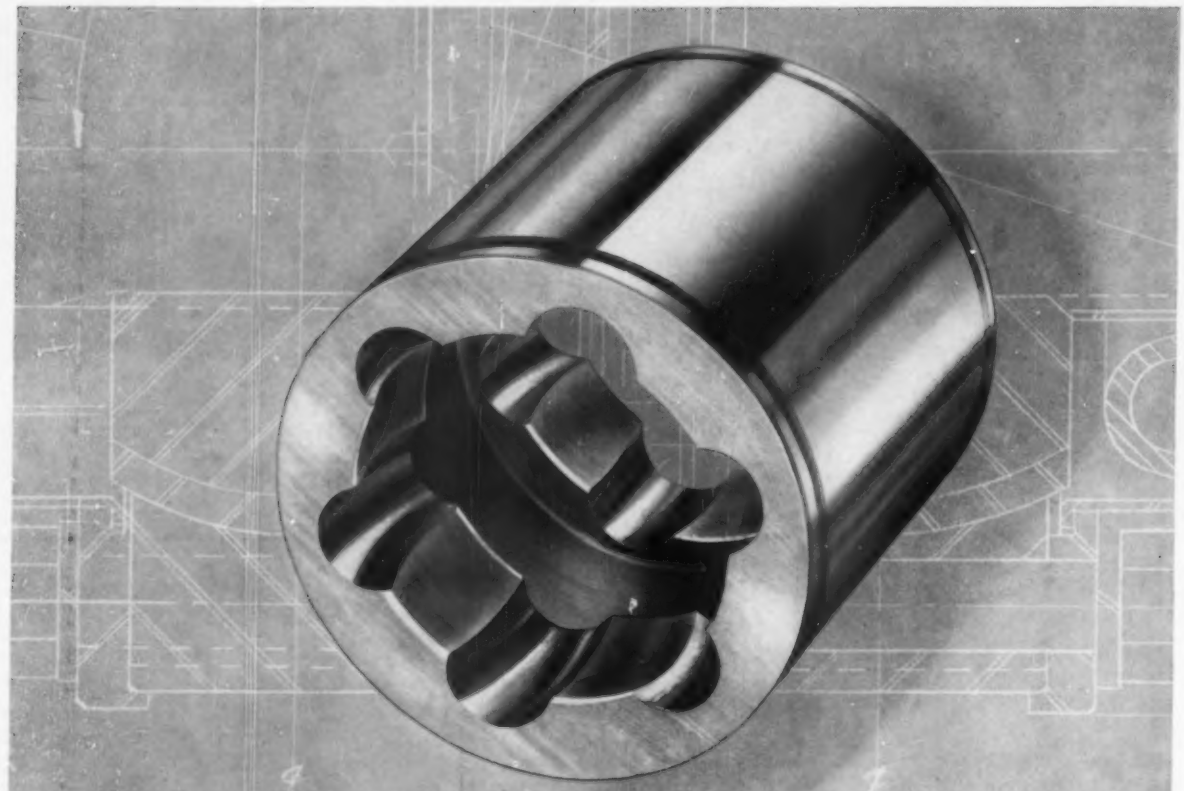

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